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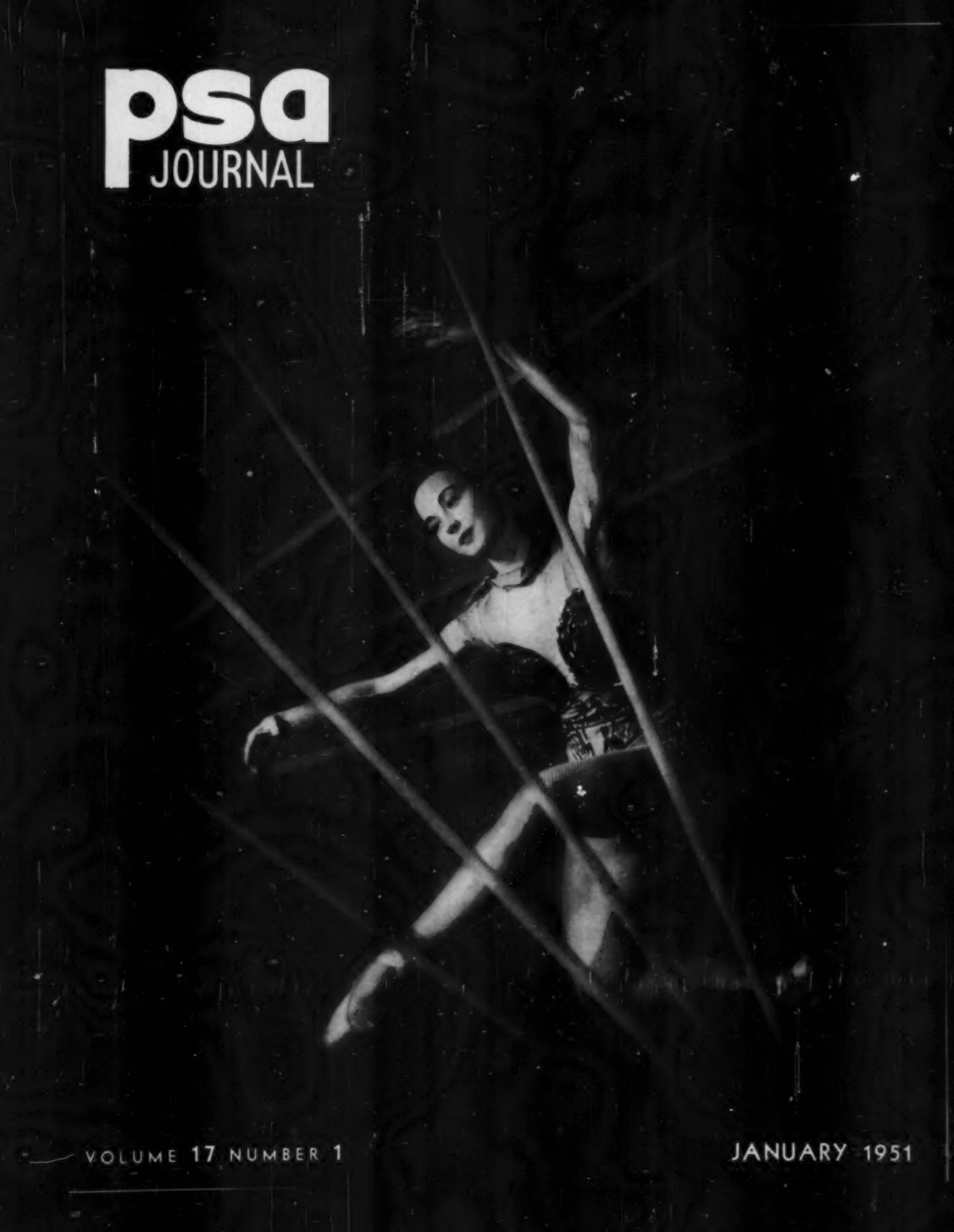

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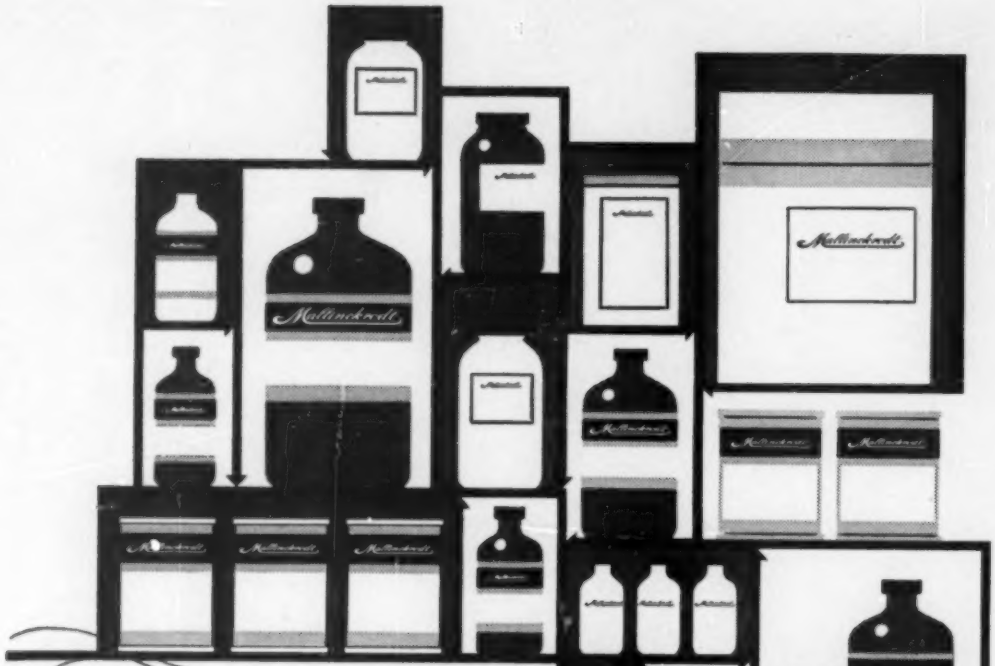

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OFFICIAL PUBLICATION OF THE PHOTOGRAPHIC SOCIETY OF AMERICA

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CONTENTS

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JOHN ROWAN . . .

THE SOCIETY has suffered a loss in the death, early in December 1950, of Past President John S. Rowan, Hon.FPSA.

HE BECAME president during the Society's formative and most trying years. He gave the Society his best and closest interest, bringing about the solution of many and difficult organizational problems. Under his leadership the Society grew, broadened, prospered. With his guidance the foundations were built for greater growth and progress.

DEEP AND abiding interest in photography motivated John Rowan. As editor of "The Camera," as salon exhibitor, as salon judge, and as an amateur photographer of marked ability who loved to create pictures, he made real and lasting contributions to photography. Many, many of today's leading photographers can thank John Rowan and "The Camera" for putting them upon the path to photographic achievement.

EFFORT WAS made, at the Society's Baltimore convention, to express admiration for John Rowan as member, officer, editor, and photographer by conferring the Society's highest honor, Honorary Fellowship. Sometimes even the highest honors are inadequate. There are men of ability and achievement who, in effect, honor the honors they receive. Such was John S. Rowan.—V.H.S.

DETERMINATION . . .

ONE FACT which the average amateur overlooks too frequently is that a picture is composed of relatively proportional parts of cerebration, inspiration, and perspiration. While there are photographers who achieve 100 percent returns, with every photograph a picture, the average person with a camera will have to be content with lesser returns. Which introduces a fourth element, determination.

NOT EVERY photograph can be a picture. Art in every field produces a large crop of

PSA CONVENTION

Detroit, Michigan, October 10-13, 1951

failures. Photography is particularly difficult because that which delights the eye in a three-dimensional world may appear something less than satisfactorily when viewed in a two-dimensional medium.

MANY AN amateur will be making this discovery while working over his vacation shots in his darkroom. Blame will be ascribed variously. Yet, eventually, the amateur may reach the conclusion that some of the fault, however infinitestimal, is his.

RIGHT THERE hope is born. Now the amateur is ready to progress. He has discovered the major source of error. Also, he has found that many, many factors enter into the making of a picture. Only when these factors properly are evaluated, properly are coordinated, properly are adjusted each to the other, properly are directed, does the photographic end-product become eminently satisfactory.

FAILURES ARE heartbreaking, yet the master of any art medium will admit, if pressed, that his mistakes have been quite as influential as his talent. He has succeeded because he has had the sense to recognize his mistakes, the courage to admit them, and the determination to correct them. Once the amateur puts his mistakes behind him—yet not so far behind they are forgotten—and keeps his determination right beside him, he is on the road to better photography.

V.H.S.

THE PICA RULE

There is nothing—with the possible exception of a corking good secretary—that an editor appreciates more than constructive criticism from his readers. However, too often his mail is heavy with communications from those who do not take the time to analyze their demands or ascertain whether it is possible or feasible to carry them out.

For example, there is an inspired campaign on at the present time by a group in the Society to have the number of supplements of PSA JOURNAL devoted to pictorial matters increased to four and the number of technical supplements reduced. It was started by a letter I wrote stating that criticism had been received concerning the contents of parts of "The Folio." It was felt that some of the material being published in divisional columns (including "The Folio") was inconsequential and of interest to a very few individuals in the Society. I wrote that if the material of limited interest was eliminated, the space thus saved could be devoted to additional supplements. However, at no time was it stated that the total number of pages in every issue of "The Folio" in PSA JOURNAL must be materially reduced.

It has been the policy of the PSA Publications Committee, as set by the Board of Directors many years ago, whenever possible to allow each Division to use their space as they see fit. The total space is determined solely by the amount of money we have to spend. We are continually working to increase the space available and we feel that progress has been made along these lines. For instance, in 1948 there were 776 pages in the JOURNAL, in 1949 780, and in 1950 910 pages, including all supplements. It should be borne in mind, however, that production costs of such items as paper, printing, etc., have increased materially during the same period. Today the net cost per JOURNAL page to the Society is approximately $25.

Among the dozen or so letters received were three from which I am going to quote, since they contain several pertinent ideas. A member from the West Coast writes:

Much of the material contained in "The Folio" is not of sufficient interest to the general PSA membership to warrant publication in PSA JOURNAL. In fact, a considerable amount of this material is repetitious. Therefore, it would seem that the best interests of both the Pictorial Division and PSA JOURNAL would be served to better advantage by the inauguration of a Pictorial Division Bulletin—similar to the very successful Color Division Bulletin—in which much of the material now contained in "The Folio" could be published.

A member from the Midwest writes:

. . . Let us not forget that the JOURNAL is an organ of an organization or society and as such should carry much space devoted to the members and their activities. Why try to make a photographic magazine out of the JOURNAL when any member can tell you that he can get a better photographic magazine at the corner newsstand at a fraction of the cost of his PSA membership, which to many means only the JOURNAL. Anyone who says that the contents of "The Folio" contain a great deal of information of little interest to other than one or two, or is inconsequential material, certainly needs to have his head examined.

Another JOURNAL reader writes:

Apparently the Publications Committee does not take into consideration that the Technical Division, with far less members than the Pictorial Division, has had four Supplements to the JOURNAL in the past year and that the Pictorial Division has had only one Supplement in the same period.

Let us analyze this statement and see how much space was given to the various PSA Divisions during 1950. Out of the 910 pages, which include all the supplements, 119 were devoted to technical material and 205 to pictorial. General articles, which are of interest to all PSA members with the possible exception of technicians, accounted for 133 pages. Broken down into percentages, the figures are:

Color		4.2%
Nature		1.0%
Pictorial		22.5%
	Illustrations 3.6%	
	Articles 11.0%	
	The Folio 7.9%	
Technical		13.2%
Motion Pictures		4.6%
General		14.5%
	Articles 3.0%	
	Travel 1.8%	
	Appleseed 2.8%	
	Historical 1.3%	
	Book Reviews .6%	
	Letters to Ed. .5%	
	Personalities 1.3%	
	Contents 1.8%	
	Equipment 1.4%	
Camera Clubs		1.5%
Photo Journalism		1.0%
PSA		22.0%
	Official Notices 5.2%	
	Directory 4.2%	
	News & Notes 6.8%	
	Divisional Columns 5.8%	
	Territorial Columns 2.0%	
Advertisements		15.3%

It is interesting to compare these figures with those published for 1949 on page 153 of the April 1950 JOURNAL. During 1949, without any supplements, the space devoted to technical material accounted for 11.5% of the total and that devoted to pictorial material 14.0%.

On pages 48 and 49 of this issue will be found the list of new members joining the Society during October and November. Remembering that some members affiliate with more than one Division, the following shows the number of new members each Division obtained:

	Oct.	*Nov.*
Color Division	77	50
Motion Picture	12	11
Nature	13	6
Photo Journalism	16	17
Pictorial	87	63
Technical	18	15
None	18	13

One fact that becomes obvious from these figures is that not enough space is being devoted to color and color slide photography. We have several excellent articles on these subjects scheduled for March and April and everything possible will be done to correct this situation.

Why do technicians get four supplements? Because they prefer to use all of their space in a form more convenient for reference and filing rather than have it included within the pages of the regular publication.

Why does the JOURNAL publish technical papers at all? Because their publication is of fundamental value to photography as a whole; because published reports of scientific and technical achievements stimulate the efforts of others and result in greater progress which is essential to the future of photography; because every photographer is a direct beneficiary of the progress which is the inevitable results of technical and scientific achievement; because PSA JOURNAL provides the only means in this country whereby the latest scientific photographic developments may be recorded for the future; and because a large part of the financial support the JOURNAL receives comes from industrial organizations that are interested in material of this kind. Their support helps to pay the freight for much of the other material we can thus publish. Under present world conditions, the scientific and technical phases of photography are becoming of paramount importance. If we get into an all-out war, PSA JOURNAL will be allowed to exist only on the basis of its scientific value—the government will not be the least interested in the hobby or amateur angle. At the present time a number of copies of PSA JOURNAL go to the Army, Navy, Signal Corps, Air Corps, etc., and their research branches and schools.

What about Territorial Columns? Pres. Mulder reports that the response to his appeal for comments from the membership was about 35 to 1 in favor of their abolition. Most members who replied felt that the space could be used to better advantage with "how-to-do-it" articles. Consequently, we are dropping the columns in their old form and using the space for more articles of a general nature. We will continue to have Territorial Editors but their jobs will be to obtain articles rather than news items.

FRED QUELLMALZ, JR., HON.PSA

OFFICIAL NOTICES

The Board of Directors held its Annual Meeting at the Lord Baltimore Hotel, Baltimore, Maryland. The meeting was called to order at 10:45 AM on October 18, 1950 by the president. The following were present: Messrs. Carlson, Cass, Chase, Clemmer, Eisendrath, Firth, Harkness, Heller, Howison, Hunter, Mulder, Oelman, Ruchhoft, Schumacher, Swann, Wheeler, Wightman, Wright, Magee, and Miss Weber. The following non-board members were present by invitation: Ralph Gray, Harris Tuttle, and Mrs. Charles F. Tuttle (secretary for the meeting).

The following appointments were approved for the coming term:

Stuart M. Chambers, Chairman of the Membership Relations Committee.
Clarence C. Ruchhoft, Chairman of the Exhibitions Committee.
M. A. Woodbury, Chairman of the Conventions Committee.
Jack Clemmer, Chairman of the National Lecture Program.
John Magee, Chairman of the Finance Committee.
Arnold V. Stubenrauch, Chairman of Headquarters Committee.
Thomas T. Firth, Chairman of the Elections Committee.
E. P. Wightman, Chairman of the Library & Historical Committee.
Herbert M. Howison, Chairman of the By-Laws Committee.
John P. Benus, Permanent Print Trustee.
Augustus Wolfman, Chairman of the Public Relations Committee.
John R. Whiting, Chairman of the Publications Committee.
Philip Cass, Chairman of the Membership Committee.
Robert L. McFerran, Chairman of the Stuyvesant Peabody Award Committee.
P. H. Oelman, member of the Stuyvesant Peabody Award Committee.
Claxton Searle, member of Stuyvesant Peabody Award Committee.
Elbridge G. Newhall, member of Stuyvesant Peabody Award Committee.
Charles Manzer, member of Stuyvesant Peabody Award Committee.
L. Whitney Standish, member of Stuyvesant Peabody Award Committee.
H. Jack Jones, member of Stuyvesant Peabody Award Committee.
Paul L. Gittings, Chairman of the Progress Medal Committee.
Stuart M. Chambers, member of the Progress Medal Committee.
George Blaha, member of the Progress Medal Committee.
Chester W. Wheeler, member of the Progress Medal Committee.
One member to be appointed.

The following appointments as Honorary Representatives were approved:

Frank J. Delima—Venezuela
Gordon C. Abbott—Mexico
J. Akkerman—Holland, Belgium, France
Kenet Burke—Australia
Ray Caron—Canada
Nat Cowan—Union of South Africa
Percy Harris—Great Britain
H. A. Larsen—New Zealand
Dr. Esteban de Varona—Costa Rica
Angel de Moya—Cuba
J. N. Unwalla—India
Francis Wu—Hong Kong, China

The president reviewed briefly the matter of chapters and he discussed specifically the "Chicago Chapter." He asked for permission to appoint a committee consisting of Mr. Oelman, Chairman; Messrs. Swann, Wheeler, Wright, and Miss Weber to study the report made by letter by Mr. Ginter's Committee and report at the October 20 meeting with recommendations for action. This suggestion was approved.

Mr. Heller reported that approximately 190 Cornerstone Members have been enrolled since the inauguration of the plan at the 1949 Convention in St. Louis. The Board approved a recommendation by Mr. Oelman that upon the decease of a Cornerstone or other Life Member the reserve be closed out to Income.

The Honors Amendment Committee was dismissed with thanks.

Mr. Heller pointed out that considerable time had been spent by Mr. John V. Kohlhaas, an engineer and member, with Messrs. Koch and Stubenrauch discussing Headquarters office space. The first floor of the main building and garage will be used for activities pertaining to operation of Headquarters office duties. The upper floors are being left for such committees as the Library & Historical and the Permanent Print Collection. It was agreed to delegate authority to the Headquarters Committee to allocate space at Headquarters.

Mr. Heller recommended and the Board approved that PSA employees be covered by Social Security under the new act effective in January at a cost to the Society of approximately $200 to $300 per year.

Mr. Heller recommended and the Board approved that the husband-wife combination membership be expanded to include a parent and one child under 21.

Mr. Eisendrath suggested that a registered letter be tried as the final notice to members before their names are dropped from the membership list. Mr. Heller agreed to consider this suggestion.

Mr. Mulder reported that 214 decals, 102 lapel buttons or pins, 64 tie bars or chains, 48 free dues for one year, and 37 Championship Medals have been distributed among members participating in the Drive of Champions. This represented approximately 730 new members enlisted since the start of the Drive in April 1950.

Mr. Harkness reported that no interest has been aroused in PSA Tops. Hartford and Philadelphia have been approached, but have turned down the idea. It was suggested that more publicity be given to the idea in the JOURNAL and that the subject be brought up at the Annual Membership Meeting.

Mr. Oelman reported that tape recordings were conceived as a substitute for lectures as provided by the National Lecture Program but were not meant to supplant the NLP. The prime purpose of tape recordings is to serve the members in small towns and the small camera clubs. The Pictorial Division and the Color Division are both proceeding independently. Mr. Oelman expressed the belief that the tape recordings would add considerable prestige to PSA and he recommended that a tie-in be made to promote PSA membership at all showings of tape recordings. The committee has decided to use Revere tape (dual track) and equipment (3.75 inch per second) since this equipment is generally available at camera stores and can be borrowed by camera clubs.

The meeting was adjourned at 12:50 PM to reconvene on Friday, October 20.

Second Meeting

The second meeting for the 1950–51 term of the Board of Directors was called to order by the president at 9:40 AM on October 20, 1950 at the Lord Baltimore Hotel, Baltimore, Maryland. The following were present: Messrs. Brown, Cass, Chase, Christhilf, Clemmer, Eisendrath, Harkness, Heller, Howison, Hunter, G. F. Johnson, H. J. Johnson, Magee, Mulder, Oelman, Reich, Ruchhoft, Scales, Stanley, Swann, Wheeler, Whiting, Wightman, Wright, and Mrs. Janson. Mrs. Charles Tuttle was present by invitation to act as secretary for the meeting.

Mr. Oelman reported on the Ginter report on Chapters. He called attention to two major weaknesses: (1) PSA has no provision for guidance of chapters and sections and (2) there is no plan of activities and services designed to benefit such organizations. The Board voted that the action taken in November 1948 amending the constitution to remove Article XIII be rescinded. It was unanimously voted that Article XIII of the By-Laws be amended to read:

"No chapter shall have any authority to act as an agent of this Society for the purpose of incurring any financial obligation which may be binding upon this Society and each chapter shall agree to hold the Society harmless from any and all such obligations incurred by it which might be binding upon the Society."

Upon the recommendation of Mr. Oelman, the Board asked the president to appoint a committee to develop policies and programming for handling chapters.

Mr. Harkness discussed the work of the Volunteer Service Photographers in veterans hospitals and recommended that PSA endorse this activity and give active assistance by individual PSA members and camera clubs. It was unanimously voted to accept this recommendation. It was unanimously voted that the policy of the Board against special presentations be temporarily rescinded for this one specific purpose for this one specific convention to add support at such times and places as may be approved by the local Convention Committee and provided that there be no specific solicitations for funds.

Mr. Chase read the following recommendations which resulted from a discussion (held by the special committee appointed by the president) with Rex Frost of Canada as follows:

1. Canada to be established as District No. 11 of PSA.
2. Two or more Representatives to be elected from District No. 11.
3. All domestic services and activities of the

Society to be made available to Canadian members through one port of entry to one central clearing house to receive, circulate and/or distribute to Canadian members all PSA activities and services such as portfolios, traveling exhibits, etc., and upon conclusion of their circulation to arrange for and return to the proper party in the States. This central clearing house to be established and maintained by the Canadian members.

4. Membership fee for Canadian members to be advanced to $10 on the anniversary date of individual membership.

5. News of Canadian activities to be disseminated on equality with other territorial districts of PSA.

Before final adoption, this report will be subject to referendum of the Canadian membership. It was unanimously voted to accept the recommendations.

Mr. Stanley stated the Nominating Committee had concluded, on the basis of its contacts with members, that PSA representation is inadequate in areas with few members. Following discussion, Mr. Howison suggested that Article XII, Section 1 be amended to read as follows: "That there be one representative from each state and/or territory of the United States and each province of Canada plus additional representation on the basis of one additional representative for each major fraction of 200 members above a base level of 200 members."

It was unanimously voted to accept the amendment to Article XII, Section 1 of the By-Laws.

The Board unanimously approved Frank Carlson as PSA Representative on the ASA Correlating Committee.

It was unanimously voted that provision be made for voting on each individual, if desired, instead of upon the entire list as a unit, wherever Board approval of honors is necessary.

It was unanimously voted to define the function of the Division Honors Recommendations Committees as follows: The Division Honors Recommendation Committee's functions are to bring to the attention of the Honors Committee worthy candidates or applicants who might otherwise be overlooked and to insure that the applications contain complete information concerning the candidate and include the names of the individual proposer and two endorsers. That the Division Honors Recommendation Committees make recommendations of their opinions concerning the relative merits of the candidates. That no honors applicant or proposer be required to submit his application through any Division Honors Recommendation Committee although from the standpoint of completeness and uniformity it may be to his advantage to do so.

The Board accepted Mr. C. B. Neblette's resignation from the Honors Committee. Upon the president's suggestion the Board approved appointment of Dr. Herman H. Duerr to the Honors Committee to complete Mr. Neblette's term which ends in 1951.

Mr. Stanley reported that the Nominating Committee is working on a slate of officers for the 1951 election, with more than one candidate for each office open for election in 1951.

Mr. Cass expressed thanks to the entire Membership Committee for the assistance given in getting over 1200 members since the last convention. He asked the same cooperation for the coming year.

The meeting was declared closed at 12:45 PM.

DRIVE OF CHAMPIONS

WHAT'S THE MATTER?

The following states have no scores in the Drive of Champions. What's the matter?

Maine
New Hampshire
Vermont
Rhode Island
North Dakota
Idaho
Nevada
Canal Zone

FLASH

Here's red-hot news for all participants in the Drive of Champions.

To those who turn in the greatest number of individual members during the month of February, the following outstanding pictorial pictures by well-known PSA members will be given as awards. Each of these prints is mounted on a 16"x20" mount and is suitable for framing by you if you wish to hang it in your home. Each print is signed by the maker and is authentic.

Winners will be chosen on the basis of the largest numbers of new members sponsored by Drive participants and received at PSA Headquarters during the month of February prior to March 1, 1951. Winners will be allowed to choose their prints with first choice going to the person with the largest number of points during the month.

Arthur M. Underwood	"Darkroom Tools"
C. B. Phelps, Jr.	"Decorative Bronze"
Jack Wright	"Getting Acquainted"
S. M. Hall	"A la Mode"
John R. Hogan	"Chesapeake Calm"
David J. Stanley	"Mariner's Guide"
E. C. Cressett	"Jamaican"
Yousuf Karsh	"Winston Churchill"
Dr. John P. Benus	"Speed Boat"
Elbridge G. Newhall	"Out of This World"
Hilda Hampfler	"Motif No. 1"
Alfred Watson	"Family Circle"
Alfred Watson	"On Tower"
Doris M. Weber	"The Wind Blows East"
A. Aubrey Bodine	"Maple Syrup Wagon"

The Drive of Champions Tally as of December 15th will be published in February.

THIS MONTH'S HINT

Don't be discouraged if your score is lower than some of those listed in PSA JOURNAL. Remember that any score with two stars is ineligible for higher awards. This means that some of those with high scores will not compete with you for District Championships, State Championships, Grand Championships, etc.

NOTICES

As PSA JOURNAL goes to press, your Conventions Committee is negotiating with members in Quebec City for a Regional Convention in the near future. If arrangements are completed, you may wish to combine attendance with a Gaspe picture vacation. Watch for further announcements.

The March Johnny Appleseed column will tell you how to take a photographic trip to Gaspe. Incidentally, the Appleseed article on "How to Control Contrast in Negatives and Prints," Part II, will appear in the February JOURNAL.

As we go to press word has been received of the death of Joseph M. Bing, Hon.FPSA, in New York City on December 9th. An obituary will be published next month.

George Eastman House

NEWS THAT the regional convention of the Photographic Society of America will take place in Rochester, N. Y., on March 2, 3, and 4 has brought a characteristic response from officials of George Eastman House, the international photographic institute.

Oscar N. Solbert, director of the institute, and Beaumont Newhall, curator, have extended a cordial invitation to all PSA members—and especially to those attending the convention—to make full use of the house facilities. As a result, plans are now under way for a stimulating program of talks, demonstrations, and clinics on photographic subjects, many of which will be held at the house. Details of technical photographic exhibits for display there are being discussed. And Eastman House officials have also invited meetings of the Rochester Technical Section, PSA, which convention members will attend on Sunday, to be held at the house if facilities are completed.

George Eastman House, which stands as a living memorial to the man who popularized photography, is known officially as the George Eastman House, Inc. Under this name it is chartered by the University of the State of New York as an independent, educational institution. Founded in 1947 by Eastman Kodak Company and the University of Rochester, which inherited the residence from George Eastman, today responsibility for its affairs rests in the hands of an 11-man board of trustees.

The gracefulness of Eastman's former home is retained in the Eastman House buildings. They sit well back from the street, with curving walks and driveways leading up to the impressively columned entrance. Spacious lawns, magnificent old trees, and ivy-covered walls lend a quiet dignity to the main house which originally contained about 50 rooms. Most of the permanent photographic displays are located on the first and second floors of this building. The contemporary exhibits are in connecting buildings behind the main house. Both the historical and contemporary display areas have access to the Dryden Theater, the newly completed auditorium for study of motion picture film art and for lectures and demonstrations in the institute's educational program. In the Dryden Theater, too, is the picture gallery, 70 by 40 feet, designed for exhibition of the largest photo displays.

The scope of the institute is as broad as photography itself. Here PSA members can see the growth of photography in exhibits ranging from the entire apparatus needed to take daguerreotypes a hundred years ago to the most modern miniature cameras, from portraits made with exposures measured in minutes to action photographs taken in the hundred-thousandth part of a second. Visitors can follow step-by-step the changes in camera design and apparatus. They can see how the limits of photography have been expanded year by year, until today there is hardly anything which cannot be recorded on film and hardly any profession which does not find the camera a useful, often indispensable tool.

The institute's basic historical display was prepared for the official opening in November 1949. Since then, the exhibits have been refined by the addition of recently acquired material. At the same time the house has expanded and extended the educational work begun in 1948. More than 15 special exhibitions have been held. Upwards of 350 tours have been scheduled for teachers and

EQUINE PHOTO ART. A photo negative showing the gait of a horse is examined by Oscar N. Solbert, director of George Eastman House. The pictures were made about 1884 in Philadelphia by Muybridge, the famed photographer of animal locomotion. They are part of the Nitzsche collection.

DAGUERRE PHOTO OUTFIT. Beaumont Newhall, curator, arranges units of a rare daguerreotype outfit. The box he holds is a mercury bath, with curtained window and a sloping rest inside for the plate. At left is a Daguerre camera and the tiny alcohol lamp used to heat the mercury and dry the plate.

students, clubs, societies, and other organizations. Material from the collections has been sent on loan to other museums, to writers and researchers, and special exhibits have been circulated. Members of the staff have lectured before groups and photographic societies, served as judges of photographic contests, and contributed articles to periodicals on the history and development of photography.

The Photographic Society of America's "Technical Salon" was the first of the series of temporary exhibitions following the formal opening of the house. It was displayed to visitors during December 1949, and was followed in January by "Photography in Archaeology," an exhibit of aerial photographs taken by Dr. J. K. St. Joseph of Selwyn College, Cambridge, England. The pictures illustrated the use of photography to detect ancient ruins that are now entirely below ground. Low-altitude aerial photographs in the same exhibit showed ruins of famous British castles and religious houses constructed during the Middle Ages.

In February an exhibition honored the man whose inventions formed the cornerstone of modern photography. This was "Fox Talbot—Father of Photography," a display of rare photographs, autographed letters, documents, books and portraits by Talbot, commemorating the 150th anniversary of his birth.

Of the two special exhibits during March, "Cameramen in Caricature," a series of lithographs and wood engravings from the Eastman House collections, featured the work of artists and illustrators who poked fun at photography as early as 1839. "Portrait of a Town," the second exhibition, was a picture story of Columbia, Missouri, photographed by members of the first photo workshop of the University of Missouri School of Journalism.

In April the "Old Rochester" exhibits of stereographs taken in the 1870's attracted local interest, while "News Photography," the 14th annual exhibit of the Press Photographers' Association of New York, brought the top news photographs of 1949 by New York City press photographers to the institute.

Other exhibits during the year included "Derivations from Color Photographs," a selection of color prints made under the direction of Dr. Ralph Evans, APSA, by a new process; "Civil War Photographs," from the collection formed by Linsley M. Gould and lent by Herbert Singleton of Salt Lake City; "Documentary Photography for Industry," a pictorial cross section of America and the oil industry prepared by the Photographic Project of the Standard Oil Company (N. J.); "Color in Bermuda and Hawaii," color prints and transparencies by Dr. C. E. K. Mees, Hon.FPSA; "High Speed Photography" by Dr. Harold E. Edgerton, FPSA; "Clarence H. White," an exhibition of the photographs by this outstanding American pictorialist; "Nature Prints," a group of 12 nature prints in color by Miss Jeanette Klute; "Crimean War Photos," by Roger Fenton, a British landscape and portrait photographer who went to the Crimea in the spring of 1855 as the first accredited war photographer.

"Roots of French Photography," an exhibition made up wholly of photographs from Eastman House and held at the Museum of Modern Art in New York, is an example of how photographs from the collections have been used by other institutions. Another was "Daguerreotype, Tintype, Ambrotype," an exhibition of early techniques prepared for the Rochester Museum of Arts and Sciences to circulate through Rochester public schools.

Since the opening of the institute more than 4,000 items

have been added to the historical collections. More than 3,000 of these additions have been gifts.

Of the many significant contributions, three might be specially noted. The largest and most important addition was the gift by Alden Scott Boyer, of Chicago, of his outstanding collection of photographs, apparatus, books and documents pertaining to the history of photography. Over 10 years, Boyer built up a unique collection of the pioneers of photography, a large photographic library of 7,000 volumes, and a quantity of historical apparatus. The collection has greatly enriched the Eastman House exhibits.

George H. Clark, a retired Rochester businessman, contributed $50,000 for construction of a special hall at the institute in memory of his father, the late Brackett H. Clark, an early Rochester industrialist and philanthropist. The hall will be designed to house displays of old and new photographic manufacturing processes. When completed, it will contain scale models and dioramas of early photo machinery and experimental equipment.

A gift of $25,000 from Leopold Mannes, FPSA, and Leopold Godowsky, FPSA, co-inventors of Kodachrome film, will be used to prepare a display showing the history and theory of color photography. It will be installed as the "Mannes & Godowsky Room" in the second floor of the house and will give the complete background of the development of color photography.

The Eastman House motion picture collection, designed for study by students, traces the development of the motion picture from its beginnings in the early 1890's. The collection enables students to examine films which constitute major developments in the techniques and style of film-making; observe the manner in which changing social problems affected the motion picture; trace the growth and changing techniques in work of leading directors; refer to newsreels and documentaries as sources in the study of specific events, or to obtain authentic details of dress and architecture.

Famous motion pictures of the early days in film history have been added to the movie collection during the year.

1870 PHOTOGRAPHER. This diorama at George Eastman House shows how the photographer of the 1870's was burdened with tripod, bulky camera and portable darkroom. He had to prepare photographic plates just before exposure and develop them on the spot.

In August the gift of 40 reels of propaganda and information films of World War II from Thomas J. Brandon, a New York film distributor, was announced. These include documentary films showing Japanese war preparations, Russian mobilization, history of the American merchant marine, and British films documenting the German V-1 and V-2 rocket bombardment. Other recent acquisitions for the motion picture collection include films from various foreign sources.

Through the efforts of friends of photography everywhere, George Eastman House has seen its reputation as the world center of photography enhanced month after month. Only seven months after the November opening more than 50,000 visitors had toured the house. Before the institute had been open for a year, it received a *U. S. Camera* magazine award for its "contributions to photography overall."

When PSA members, with their close bond to photography, visit Eastman House, they can examine with pride that may well be personal this unique institution and treasure-house of the art and science of photography.

BEGINNING OF MOTION PICTURES. These Brownie Girl Scouts are looking at some of the early motion picture apparatus in an exhibit at Eastman House.

PHOTOGRAPHY IN ASTRONOMY. This exhibit in the Hall of Contemporary Photography at Eastman House shows photography at work in the science of astronomy.

PHOTOPROGRESS in 1950[*]

GLENN E. MATTHEWS, FPSA [**]

AT THE middle of the century, photography continued to arouse interest as a national hobby, served an increasing number of industries as a recording medium and had many new applications in the fields of education, government and science. A market research survey indicated that about 26 million families, or roughly half those in the United States, take pictures. A fair percentage of these were in color and many snapshots were being made at night with flash lamps. Nearly 160,000,000 flash bulbs were sold in 1949 and it was predicted that this number would be tripled by 1955. The demand for films and papers was generally above that of 1949 though equipment sales fell off. As a result of the Korean situation and the expanded national defense program, it was expected that an increasing portion of photo-production facilities would need to be devoted to items required by the government.

Materials and Equipment

Encouraging progress was noted in connection with the conversion from nitrate to the new acetate safety film base. It was announced by Eastman that by the end of the year the entire output of their Kodak Park plant in Rochester would be on safety base. A different type of safety film having a nylon base was reported to be in the development stage at the Du Pont laboratories (Mot. Pict. Herald, *180:* 13, July 1, 1950). The Gevaert Company were expected to use a new acetobutyrate base for their Gevacolor films (Studio Review, March 30, 1950, p. 4).

The world's largest color transparency, known as "The Colorama," was displayed in New York Grand Central Station in May. It was 18 feet high and 60 feet long and was illuminated from the rear by a 61,000-watt bank of lights. The subject of the transparency was changed at intervals throughout the year. Each transparency was produced at Kodak Park in Rochester, New York, from two or more color originals, measuring no more than 5 by 9½ inches. A special enlarger projected narrow sections of each original on 19-inch by 18-feet strips of a new color print film. After processing, the strips were spliced into an 18- by 60-foot transparency. It was estimated that the transparency would be seen 219 million times by people passing through the terminal during one year (Nat. Phot. Dealer, *16:* 44, June, 1950). A photo-information center was established on the east balcony behind the transparency.

Comparatively few new color materials were introduced. One of these, Kodak Ektacolor Print Film, was announced in August. With this sheet film, contact color prints or enlargements could be made by the user from any Ektacolor negative and processed with the same chemicals used for this color negative. The Kodak Colorama shown in New York was made on this new color print film. Black-and-white prints from Ektacolor negatives could be obtained with a new pan-sensitized paper, known as Ektacolor BW Paper.

Agfa announced a commercial integral tripack printing paper having the same characteristics as Agfacolor Positive Film for producing paper prints in color from color negatives. The effective sensitivity of the material was said to be that of bromide paper (Brit. J. Phot. *97:* 134, March 17, 1950). A revival of interest was noted in the Duxochrome color print process of J. Hertzog, Bremen, Germany, which was demonstrated in London in May. With this subtractive transfer process, prints can be made by projection from separation negatives onto three sheets of Duxochrome film coated with a photographic emulsion containing the necessary dyes. Each

[*] Reprinted from Americana Annual, 1951, Yearbook of the Encyclopedia Americana.

[**] Technical Research Editor, Kodak Research Laboratory, Rochester 4, New York.

Eastman Kodak Company

THE WORLD'S LARGEST COLOR PHOTOGRAPH—KODAK COLORAMA. *Left.* Special projector being used to print vertical segment, 19 inches by 18 feet in size. *Middle.* Segment on Ektacolor Print Film is processed. *Right.* Inspecting and matching segments for complete picture.

of the films is developed in a tanning developer to produce a colored relief image from which the silver is bleached before transfer of the yellow, cyan, and magenta images (ibid. *97:* 275, June 2, 1950).

A new 16mm duplicating film, known as Ansco Type 238, was announced in June for making color duplicates from soft gradation color originals or master positives. During the last four years, Ansco brought out a 35mm reversal color film, Type 735, for camera use which could be printed on Ansco Color Release Film Type 732 (Amer. Cinemat. *31:* 205, June, 1950).

In May the Eastman Kodak Company announced an important manufacturing change in its Kodacolor Film for roll-film cameras; henceforth, this film would be supplied in 8-exposure instead of 6-exposure rolls in all sizes previously available and in the 828 size, announced in June. The quality of Kodacolor prints was improved appreciably. A new surface of Kodak Dye Transfer Paper, A-DW (white, luster, smooth) was added.

Other new sensitized materials included the following: Dynacolor 8mm and 16mm motion picture film; Gevaert Artex and Tonex projection papers; Gevaert Gevapan Film (100 ASA Index) and Gevachrome Film (high speed ortho); Kodak Opalure Print Film (for viewing by transmitted light); Polaroid-Land Film, Type 41 (for black-and-white prints; their Type 40 film gives sepia prints).

A demonstration was given in April at the meeting of the Technical Association of the Lithographic Industry in Rochester of an experimental offset printing plate for high-quality, low-cost monochrome and black-and-white reproduction. The plate has a surface of specially hydrolyzed cellulose.

Two new photographic emulsions for recording nuclear tracks were developed by Eastman Kodak Company. These are Type NTB2 Plate and Type NTC3 Plate; the latter was designed to record low-energy alpha particles and low-energy protons to 7 mev. This firm also developed two special plates, called Kodak Autoradiographic Plates, Type A and Type No-Screen, for use in radioactive isotope research.

J. Wolbarst, National Photo Dealer

Left. Hanging completed color picture, 18 by 60 feet in size. *Right.* Typical Colorama print as displayed in Grand Central Station, New York City.

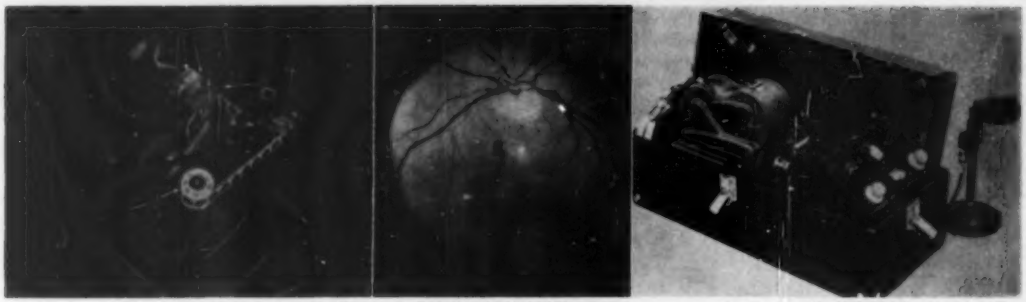
Although the photo-magazines were filled with advertisements of many types of equipment, only a small percentage was new. Several of the newer cameras were European importations as noted in the following list: three Agfa cameras, Karomat (35mm with Xenon f/2), Ventura and Ventura DeLuxe (for 2¼ by 2¼ pictures); Alpa Prisma Reflex (35mm Swiss); Ciro 35 (with range finder); Ihagee Kine Exacta "V" (35mm German); Kodak Pony 828 and Kodak Pony 135 (each with f/4.5 Anaston 51mm lens); Kodak Duaflex II; Zeiss Contessa 35 (with f/2.8 Tessar). A new British camera, called the Autocamera, was said to take 200 exposures 1-inch square on 35mm film at a rate of four per second with one main-spring winding (Functional Phot. *1:* 4, March, 1950).

An old exhibition, the Photo-Kino Fair in Cologne, Germany was held for the first time since the war. On the eve of the fair, the E. Leitz firm completed their 500,000th Leica called the "Standard." The first Leica was introduced in 1923 and is generally regarded as the forerunner of small cameras using 35mm film for still pictures.

A self-processing camera was described by E. W. Jackson with which developed photographic images could be made available for examination within 10 seconds after exposure. Service applications of this device included marking of shell bursts, submarine periscope target photographs and cathode-ray tube image records (Brit. J. Phot. *97:* 55, February 3, 1950). Equipment for high speed processing of 35mm films was described by C. M. Tuttle and F. M. Brown (J. Soc. Mot. Pict. Tel. Eng. *54:* 149, February, 1950) and for 16mm film processing by J. S. Hall, A. Mayer and G. Maslach (ibid. *55:* 27, July, 1950). Recent work on rapid processing methods by C. E. Ives and C. J. Kunz showed that times of treatment can be reduced by a factor of 25 to 50, and equipment can be made much more compact and simpler to operate and maintain (ibid. *55:* 3, July, 1950).

A high speed camera was announced in May by Bausch & Lomb Optical Company with which photographs can be made of the retina, nerve fibers and other structural elements of microscopic size within the inner recesses of the eye. The camera is combined with an ophthalmoscope and uses a carbon arc for providing the high intensity illumination required. Another clinical camera uses an electronic flash tube built around the lens of a 35mm camera. This device was designed by R. W. Knebel, of Rochester, New York, and with it pathological or surgical records can be made on ordinary or color film with exposures of 0.0001 second.

Ever since the introduction of the first sound-on-film projector for 16mm film more than a decade ago, cine amateurs have speculated on the need for a camera that would record the sound and expose the picture simultaneously. In the meantime, the quality of tape recording was improved and several types of tape recorders were marketed. To some extent these developments obviated the need for a single-system sound-on-film camera. That the need still exists, however, is believed by Berndt-Bach, Inc. of Los Angeles who introduced late in 1949 their



Kenyon Instrument Corporation, Huntington Station, Long Island, New York. *Bausch & Lomb Optical Company* *Berndt-Bach, Inc., Los Angeles*

HIGH SPEED 35MM FILM PROCESSING APPARATUS. *(Left).* Film moves past exposure station (1), a processing station (2), a projection station (3), and onto a take-up reel (4). Total processing time is 4 seconds. INTERIOR OF HEALTHY HUMAN EYE AS PHOTOGRAPHED WITH A NEW RETINAL CAMERA. *(Center).* Note veins and arteries leading to optic disc. AURICON CINE-VOICE 16MM CAMERA. *(Right).* A portable, single-unit system for making sound pictures in the home or for business use. Variable area sound track is recorded photographically along one edge of film, 26 frames behind the picture.

Auricon Cine-Voice 16mm camera which uses a mirror galvanometer to record a variable area track along one edge of the film in place of one row of perforations (Home Movies, *16:* 626, December, 1949).

Professional projection and sound quality were claimed for two new 16mm projectors for auditorium use. One was announced by Eastman Kodak Company and the other by Mitchell Camera Corporation (Film World, *6:* 176, April, 1950). A new f/1.5 lens for professional 16mm projectors was described by W. E. Schade (J. Soc. Mot. Pict. Tel. Eng., *54:* 337, March, 1950). Other new items of cine equipment were: Bell & Howell 8mm Magazine Camera—172; Bolex M-8 (8mm) Projector; Cine-Kodak Royal Magazine Camera (16mm); CinKlox Super FM-7 16mm Camera; DeJur Citation 8mm Camera; Keystone Olympic 8mm and Mayfair 16mm Cameras; Kodascope Pageant Sound Projector; Pathe Super "16" Camera; Revere "55" Camera and "85" Projector (both 8mm) and Revere "26" Camera (16mm).

The color temperature of Sylvania flash lamps was lowered by a change in their manufacture to match more closely that of General Electric flash lamps with the result that essentially the same light balancing filters could be used with either brand of lamps for color photography. Interference filters for transmitting pure colors were developed by Bausch & Lomb Optical Company. They are formed by placing a layer of a metallic salt, magnesium fluoride, between two thin semi-transparent silver mirrors. Wavelengths of light are transmitted of double the thickness of the fluoride coating (Photogram. Eng. *16:* 100, March, 1950). An interference mirror for arc projectors was described by G. J. Koch which would transmit infrared (heat) rays and reflect light rays thus providing a means of lowering the heat on the film passing through the projector gate (J. Soc. Mot. Pict. Tel. Eng. *55:* 439, October, 1950).

Two new portrait lenses were demonstrated by Eastman Kodak Company of 12- and 16-inch focal length which gave variable soft focus effects by means of spherical aberration. The same firm also introduced four new Ektar lenses for use in the field of graphic arts. Of 12-, 18-, 24-, and 30-inch focal length, they are fully-apochromatic and contain a "built-in" aperture control which is precisely accurate and easily operated. A six-element, anastigmat 2-inch f/1.6 lens for 16mm projection was announced by Bausch & Lomb Optical Company. Further developments in plastic lenses were reported by J. Johnson for use as single lenses, achromatic systems and infrared telescope objectives (Functional Photography, *1:* 7, March, 1950).

Miscellaneous items of equipment included: Range-O-Matic meter (for use as a range finder, exposure meter, and flash calculator); SVE Entertainer 300 Slide Projector; Stereo Projector for 2- by 2-inch slides made with a Stereo Realist Camera; S. E. I. Photometer adapted for densitometry; Kodaslide Table Viewer—4X; Kodak Two-Way Flashguard; Ansco Rediflex Outfit; Kodacraft Outfits for amateur printing. Two items of professional equipment were demonstrated by Eastman Kodak Company: a Master Power Printer and a Continuous Paper Processor, Model 2.

A few new package chemicals were introduced including: Ansco Permadol, Vividol and Supradol Developers, and Ansco Rapafix; Hunt H-8R Replenisher Developer; Kodak Dektomat Developer and Ektachrome Developer Replenisher. Procedures for processing Ektachrome and Ektacolor films were shortened by changing from 68 F to 75 F. An improved processing method was described for Ansco Color Film (Ansconian, p. 14, July-August, 1950).

The Photographic Process

In view of the water shortage suffered by New York and some other parts of the country last winter, a paper published by J. I. Crabtree on water conservation was very timely. New techniques for saving water supplies in photographic processing were described (PSA Journal, Sect. B, *16B:* 70, August, 1950). A mixture of diacetone alcohol in petroleum ether was found to be a most effective way of removing water quickly from a photographic material (Brit. J. Phot. *97:* 268, May 26, 1950). Types of ion exchange resins suitable for the reclamation of

photographic wash water were discussed by S. Levinos as used by the U. S. Signal Corps Engineering Laboratories (Phot. Engineering, *1:* 69, July, 1950).

Stabilization processing of films and papers to make the image reasonably permanent to heat, light, and moisture for temporary record purposes was described by H. D. Russell, E. C. Yackel and J. S. Bruce (PSA Journal, Sect. B, *16B:* 59, August, 1950). A new era in photographic emulsion making was claimed by F. W. H. Mueller to have begun in 1937 when R. Koslowsky found that the introduction of gold complex salts into silver halide emulsions produced an appreciable speed increase with little effect on graininess. A possible mechanism for the effect was discussed by Mueller who also indicated its importance on modern emulsion manufacture (ibid. *16B:* 47, June, 1950).

New light was shed on an old subject when R. G. Rudd published his paper on "Copying the Black-and-White Print." Improvements in sensitized materials and lenses in recent years are said to have made it possible to produce copy prints of some photographs which are virtually indistinguishable from the original. Methods of preparing intermediate prints by various procedures are described (ibid. *16B:* 30, June, 1950).

Color Photography

The growing trend of public interest and expanded use of color photography was continued. Improved quality color prints were obtainable from numerous processing laboratories. A more critical judgment of color quality was noted among advanced amateur and professional photographers.

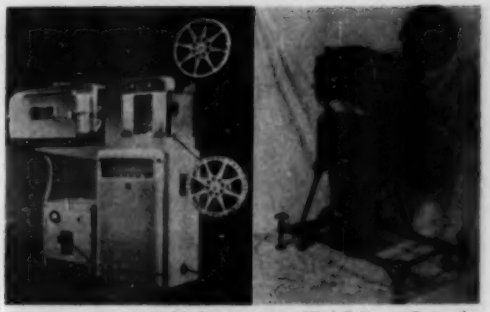
Besides the well-known Ansco Color, Kodacolor, Kodachrome, Ektachrome, and Ektacolor materials, Dufaycolor screen-film was said to be available again in ample supply. The addition of Ektacolor Print Film was expected to encourage the making of more duplicate color prints.

A store in Pembroke, Ontario, about 100 miles northwest of Ottawa carried no merchandise but instead was stocked with 3,750 different color slides of the goods in stock at the main store in Ottawa. The customer in the "Vis-O-Matic" store at Pembroke simply made a selection from the projected slides of the items desired, the order was teletyped to Ottawa and shipped the next day (Business Week, June 17, 1950, p. 58).

A high-speed processing method which cut the time required for processing color film from 90 to 20 minutes was tested by the Engineering Division Photographic Laboratory at the Wright-Patterson Air Force Base. Basis of the technique was a pre-hardener which permitted processing to be done at 80 F instead of 68 F (Wall St. Journal, *136:* 1, July 10, 1950).

The use of a sodium sulfate bath as one step in the procedure for making dye transfer matrices was advocated by C. E. Ives and C. J. Kunz as a means of reducing the swelling of certain types of matrices (Amer. Phot. *44:* 60, February, 1950). Optical characteristics of images derived from colored couplers and color correction obtainable with such couplers were discussed by W. T. Hanson, Jr. (J. Opt. Soc. Amer. *40:* 166, March, 1950).

Details were published of the Time Color-Scanner, a device for the automatic production of balanced, continuous-tone, three-color and black separation negatives from color transparencies. The scanning light-beam first passes through the transparency, then the transmitted beam is split into red, green and blue components, and converted into three electric signals which pass through electronic circuits where correcting effects can be introinduced; finally, the corrected signals are reconverted to light for exposing the separation negatives. The entire process takes 65 minutes for an 8- by 10-inch subject scanned at the rate of 250 lines per inch (Modern Lithography, *18:* 28, May, 1950). The cuts for an 8-page color story on "Spring in the Desert" which appeared in *Life* for April 10, 1950 were made with this apparatus.



Eastman Kodak Company *Mitchell Camera Corporation*

TWO PROFESSIONAL 16MM SOUND PROJECTORS. *(Left).* Eastman 16mm Sound Projector, Model 25. *(Right).* Mitchell "Giant" 16mm Sound Projector. Models shown with arc illumination; also available with tungsten lamp.

Several useful papers were published in recent years on aspects of the important subject of color sensitometry. These papers and added data were assembled and printed in a report of the Society of Motion Picture and Television Engineers in June under the title, "Principles of Color Sensitometry." The wide usage of the term, color temperature, as a specification for light sources other than tungsten lamps was deprecated by O. E. Miller, who pointed out that the term is inadequate to define any light source for color photography which departs appreciably in energy distribution from the black body (J. Soc. Mot. Pict. Tel. Eng. *54:* 332, April, 1950).

In the field of professional color motion pictures, the Technicolor Corporation, largest producer of color films, reported that 44 feature pictures were made in 1949 and 59 were in preparation or under contract for production in 1950. Acquisition of new equipment would permit plant capacity to be increased to 300 million feet of positive prints (N. Y. Times, *99:* 45, April 11, 1950). While Technicolor films continued to lead the field, other color films such as Ansco Color, Cinecolor, Du Pont Release Color Positive, and Eastman Color were either under extensive test or in actual use. Improved techniques were said to have encouraged wider use of 35mm color release prints from 16mm color originals (Amer. Cinemat. *31:* 235, July, 1950).

In Europe, the following processes were being studied or used: Agfacolor negative-positive process (in Germany); Agfacolor-two-color bipack negative-positive

Newton, Ottawa

CUSTOMERS IN STORE EXAMINING COLOR PHOTOGRAPHS OF MERCHANDISE. Store of A. J. Freiman, Ltd., in Pembroke, Ontario, carries no merchandise. Uses 3,750 color slides of available articles in main store in Ottawa. Customer examines projected photograph and makes out order which is teletyped to be filled and shipped next day.

with controlled application of a third color (Studio Review, March 30, 1950, p. 11); Ferraniacolor-negative-positive process (Ferrania, *4:* 2, April, 1950); Gevacolor-negative-positive process using monopack triple-layer films (Studio Review, March 30, 1950, p. 4); Opticolor —a three-color additive method which used a beam splitter to make three color-corrected negatives; these are printed on a lenticular film having 30 lenses per mm (Kinemat. Weekly, *399:* 39, May 11, 1950).

Scientific Investigation

A short historical review of the chemistry of the photographic sensitizing dyestuffs was published by J. D. Kendall (Chem. and Ind., February 18, 1950, p. 121). A new simple electron microscope developed in Germany by E. Müller permitted photographs to be made of a molecule of phthalocyanine having 57 atoms, the smallest speck of matter ever seen by man (Life, *28:* 67, June 19, 1950).

Quantitative determinations of electrostatic and magnetic fields of very small dimensions were reported by L. L. Marton who recorded on a photographic material the shadow image of fine wire mesh placed in the path of an electron beam. From the distortion in the shadow network caused by deflection of the electrons as they pass through the field, accurate values of field strengths were computed (Scientific Monthly, *71:* 3, July, 1950). Schlieren photographs were made at the Langley Aeronautical Laboratory to study the pressure distribution about aerodynamic bodies at both subsonic and supersonic speeds. Data from such studies were expected to be of use in supersonic aircraft design (J. App. Physics, *21:* 619, July, 1950).

Cloud chamber photographs made at California Institute of Technology in May revealed tracks of two new subatomic particles, one neutral and the other charged, bringing the total to 13 that had been recorded with the aid of photography since 1897 (Life, *28:* 69, May 15, 1950).

Increased use was being made of nuclear photographic emulsions on plates and in pellicle form to record the tracks of electrically charged particles. The special techniques for the photomicrography of such tracks were described by Mrs. I. Tschiderer in connection with tracks recorded by electrons, mesons, protons, deuterons, alpha particles, and fission fragments (PSA Journal, Sect. B, *16B:* 43, June, 1950). Improved emulsions for autoradiography were used by G. A. Boyd and H. Levi to register C^{14} beta tracks in a liver section from a rat, and each track could be followed to its entry point (Science, *111:* 58, January 20, 1950).

High speed Schlieren motion pictures and instantaneous pressure measurements were used by Marjorie W. Evans and associates to study augmented flames in half-open tubes and the effect of eddy motion in combustion processes of interest to designers of jet aircraft (J. App. Physics, *21:* 44, January, 1950). C. A. Morrison and H. O. Hoadley described a new instrument called a spectrosensitometer with which photographic materials could be exposed through the spectral range of 3500 to 9500 A for the evaluation of spectral sensitivity (PSA Journal, *16B:* 64, August, 1950). Quick appraisal of oscilloscope records was facilitated according to E. Blutman by photographing the tube with a modified Polaroid-Land camera which gave a finished print one minute after exposure (Tele-Tech, *9:* 72, April, 1950).

An interesting review of photographic materials, instruments and techniques for medical photography was published by J. Weber in The Merck Report, April, 1950, p. 8.

Motion Pictures and Television

One of the most sustained programs in the use of motion picture films for education was that of the U. S. Department of Agriculture which began using films in 1908. Besides an extensive service in the United States and its territories, selected subjects had been translated into 22 languages and made available through the State Department for use in other countries. An entire issue of Business Screen Magazine (No. 4, 1950) was devoted to various aspects of the film production and distribution program of the Department of Agriculture.

Although the patronage of motion picture theaters in general continued the drop-off trend noted in 1949, the construction and use of outdoor drive-in theaters expanded. The first drive-in theater was built in 1933 at Camden, N. J., and there were about 60 theaters at the end of the war whereas at the close of the year 1950, more than 1,000 such theaters were in use (J. Soc. Mot. Pict. Tel. Eng. *54:* 161, February, 1950).

In an article entitled, "Television's Challenge to the Movies," Samuel Goldwyn, noted pioneer motion picture producer, stated that by the end of 1951 the total investment in television will exceed the sum of two and one-half to three billion dollars now invested in the entire motion picture industry. The growth of the motion picture industry was reviewed and Goldwyn pointed out that one of the reasons for the success of the motion picture as an entertainment medium was that the industry had adjusted

itself promptly to new developments. The radio did not displace the newspaper or the motion picture, and in his opinion neither would television displace them; each medium should supplement and augment the other. The quality of motion pictures will be raised and the quantity will be lowered (N. Y. Times Magazine, March 26, 1950, p. 17).

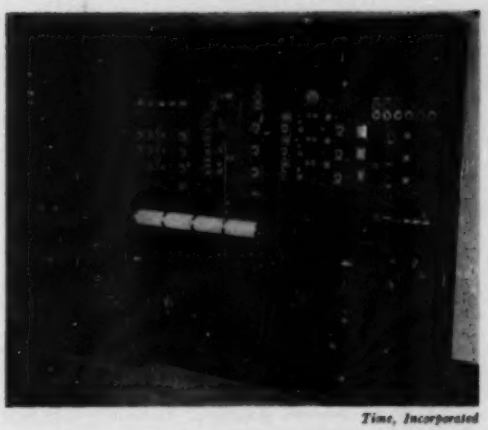
The use of motion picture films for television programs appeared to be increasing. One producer-director, F. Tilford (CBS—Silver Theater), even predicted that all television shows would be on film within another year because the method cut production costs compared with live talent shows, simplified rehearsals, and provided a permanent record for future use (Film World, *6:* 198, April, 1950). The production of a television newsreel was stated by J. Sandstone to require careful planning and rapid handling. Thousands of feet of film were handled daily from every part of the world. If time did not permit a print to be made, the negative was televised and the image reversed electronically (Amer. Cinemat. *31:* 94, March, 1950). A plan, known as Phonevision, of bringing good motion pictures into the home on television receivers was to be tested in Chicago in December by the Zenith Corporation. The incoming signal would be scrambled unless the subscriber called the telephone company and requested a "keying signal" which is carried by the telephone line.

The special lighting and processing requirements of films for television programs were discussed by O. Sandvik and T. G. Veal in a paper read in England on May 2 at a joint meeting of several societies as a memorial to the late A. G. D. West, British television pioneer (Brit. J. Phot. *97:* 270, May 26, 1950).

The Federal Communications Commission on September 1 gave their tentative approval to the Columbia Broadcasting System's method of color television. The Commission also indicated that the proponents of other color television systems would have the chance to make demonstrations until December 5. The introduction of color television, when it happens, will pose some photographic problems, as color motion pictures will be televised and records of programs as received will need to be made on color films. Some of these problems were discussed by W. R. Fraser and G. J. Badgely who used a Berndt-Maurer professional 16mm camera to photograph on Kodachrome film the image on a color television kinescope (J. Soc. Mot. Pict. Tel. Eng. *54:* 735, June, 1950).

Aerial Photography

The first aerial color photographs taken from jet planes in combat were made of the Korean War by Lieut. Colonel J. W. Dixon, U. S. Air Force. His camera was a motor-driven K-22 with a 12-inch lens which takes sequence pictures on 75-foot strips of aerial Ektachrome film, especially adapted to high-speed aerial photography. The film was processed in 100 minutes in a field tent where the outside temperature was 100 F (Life, *29:* 79, September 18, 1950). A new photo airplane, RB-45C, of the U. S. Air Force was reported to have five camera stations and ten cameras. Three panels in front of the photo-navigator contain all controls necessary for operating each of the ten cameras (Skyline, August, 1950.



Time, Incorporated

ELECTRONIC SCANNER FOR MAKING SEPARATION NEGATIVES FROM COLOR TRANSPARENCIES. Scanning light beam passes through transparency; then is split into red, green and blue components; each component is converted to an electric signal which passes through electronic circuits for correction; finally, the corrected signals are reconverted to light for exposing the separation negatives.

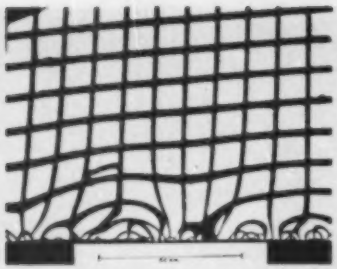
p. 10). An Air Force camera that can photograph a 26-mile strip of the earth in two seconds at 10,000 feet was described briefly in an Associated Press story published in June. Horizon to horizon is recorded, thus obviating the need for a triple-camera unit previously used. It was developed by Boston University Optical Research Laboratory in cooperation with the Air Force.

Documentary, Industrial and Technical Uses

It was announced in June that the story of Pittsburgh and its people would be preserved in a documentary collection of photographs at the University of Pittsburgh. The new photographic library will file both contemporary and historical photographs. At Eastman House, an educational photographic institute in Rochester, N. Y., the Dryden Theater wing was under construction and many special exhibits were displayed during the year. About 75,000 persons visited the institute since its opening in November, 1949.

A procedure for the documentation of technical information was described by J. W. Kuipers with particular reference to the needs of industrial organizations. The method was an extension of conventional microfilming combined with the use of microcards. Details were given of cameras, file equipment for microfilm strips, and microfilm readers (Ind. Eng. Chem. *42:* 1463, August, 1950). A new microfilm reader, Model MPE, which will project both 16mm and 35mm film, perforated or unperforated, was announced by the Recordak Corporation. A selected list of references entitled, "Microfilms and Microcards: Their Use in Research," was published by the Library of Congress in June.

High-speed photography was used by the Navy in de-



Electron-Optical Shadow Record by L. L. Marton, National Bureau of Standards. Reproduced from J. App. Physics and Scientific Monthly.

SHADOW PATTERN OF A MAGNETIC FIELD AT THE EDGE OF A COBALT CRYSTAL. An electron lens system produces a shadow image on a photographic material of a fine wire mesh in the path of the electron beam. From the distortion in the network caused by deflection of the electrons, the field strength of the crystal can be computed accurately. Photo-record developed and printed in conventional manner.

veloping new torpedo designs according to an article by W. H. Christie (PSA Journal, Sect. B, *16B:* 55, August, 1950). Some aspects of deep sea underwater photography as carried out by expeditions sent out by the Woods Hole Oceanographic Institution were discussed by J. Hahn (ibid. *16B:* 27, June, 1950). The requirements of the British Admiralty and other organizations for suitable techniques for underwater photography were described by J. B. Collins who published data on cameras and lighting equipment. A "free" compressed air diving technique was said to permit photography underwater as easily as in air (Phot. J. *90B:* 24, January-February, 1950).

Instruments and photo-materials used in the rocket-test program at Inyokern, China Lake, California were described by C. H. Elmer. Problems encountered when exposing color films at high shutter speeds are mentioned (J. Soc. Mot. Pict. Tel, Eng. *54:* 140, February, 1950). The photographic apparatus at the pressurized ballistics range of the Naval Ordnance Laboratory at Silver Spring, Maryland was described by L. P. Gieseler. Each of the 25 photographic stations is fitted with electronic controls (ibid. *55:* 53, July, 1950). M. Sultanoff reported that shock waves close to the edge of explosive charges had been successfully photographed at rates exceeding 100 million frames per second. A multi-slit focal plane shutter was moved optically across the film plane by a rotating mirror (ibid. *55:* 158, August, 1950).

Bibliography

American Documentation, a quarterly review of techniques, problems, and achievements in documentation began publication in January. It replaced the *Journal of Documentary Reproduction,* which stopped publication in 1944. Another quarterly made its first appearance in January, *Photographic Engineering,* the official publication of the American Society of Photographic Engineers. *Photo Guide Magazine* was started in April by Focal Press Ltd., London. *Chinese Photography* made its appearance in Hong Kong under the editorship of Francis Wu. *Photographic Workshop* was started by the Camera Workshop Publication, New York. *Photo France* made its debut in Paris, under the auspices of Revue d'optique. The introduction of a modest quarterly called *Vignette* probably meant more to its readers than all other new issues of the year; the bulk of its readers were hospitalized war veterans.

A list of new books included:

Abel, C., *What's Wrong with This Picture?,* Greenberg, N. Y.
Brodbeck, E. E., *Handbook of Basic Motion Picture Techniques,* Whittlesey House, N. Y.
Costa, J., *The Complete Book of Press Photography,* National Press Photographers, N. Y.
Connell, W., *About Photography,* T. J. Maloney Co., N. Y.
Deschin, J., *Say It with Your Camera,* Whittlesey House, N. Y.
Fayolle, P., and Naslin, P., *Photographie instantanée et cinématographie ultra rapide,* Revue d'optique, Paris.
Lummerzheim, H. J., *Farbenphotographie,* Radio-Foto-Kinetechnik, G. m. b. H., Berlin.
Mayall, R. N., and M. L., *Skyshooting—Hunting the Stars with Your Camera,* Ronald Press, N. Y.
Natkin, M., and Schwerin, K., *La Photographie en couleurs,* Tiranty, Paris.
Kodak Color Handbook, Eastman Kodak Company, Rochester, N. Y.
Shaw, L., *Architectural Photography,* G. Newnes, London.
Selwyn, E. W. H., *Photography in Astronomy,* Eastman Kodak Company, N. Y.

Gray Scale and Tone Control—Part II*

DAVID DARVAS, APSA

Adapting the Gray Scale to Negative Analysis

The composition of our negatives and prints have, besides a few major requisites, a dominating design of space distribution. These spaces are important because they constitute the actual areas of our picture's subject matter. They are, in most cases, geometric in shape and outline. The three basic shapes of design are also the basic roots of all third dimensional objects. They are the globe, the cube, and the pyramid. Their two dimensional names are the circle, the square and the triangle.

Notice how many subjects which we photograph can be related to these three root shapes. Not only do these shapes prevail in our subjects, but they also appear as divisions of area within the composition.

* Continued from page 781, December 1950, issue.

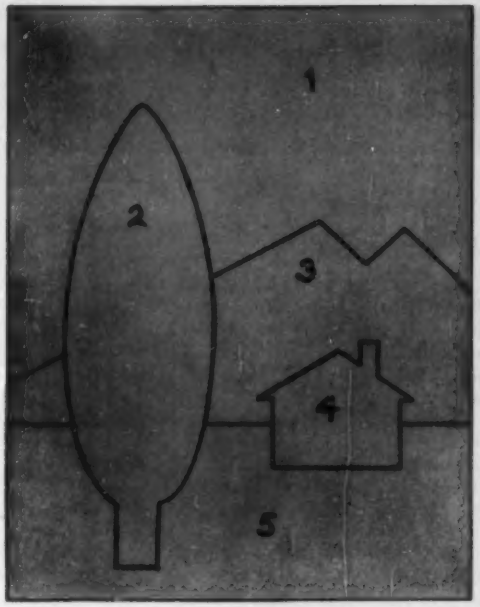


FIGURE 12

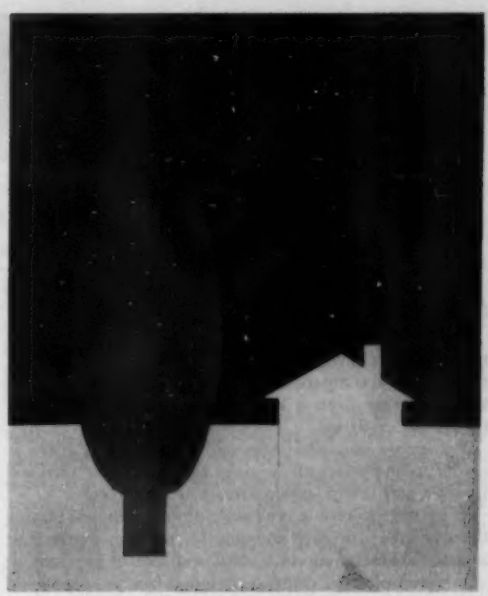


FIGURE 13

The illustration in Figure 12 is a typical landscape design, composed of obvious geometric shapes. These shapes depict familiar subjects.

Now concentrate on a shape or space that represents a particular subject. There is a geometric shape area we recognize as a house. Another is a tree. The remainder we recognize as foreground space, a mountain, and the sky. If we were to cut along the outlines of each space, we would obtain a set of jig-saw puzzle cut-outs, each independent of the others, yet related to each other.

Each space, or cut-out section, should be considered as a major area, since each one is different and depicts a different subject. We will number them in sequence in order to identify them more easily.

	Number	
The Sky	1	Area
Tree	2	"
Mountain	3	"
House	4	"
Foreground	5	"

Any composition of any landscape, either in negative or print form, can be divided into similar major areas, just as in Figure 12.

Suppose that Figure 12 were an actual scene and we composed our picture in the above design and made a few exposures. Upon development, our negatives could be divided into the five simple design areas, just as we did with the pen and ink outline illustration. Notice that not only did the division isolate area as a design, but it also isolated each as an area of similar densities.

This is a clue for analysis, since, in most cases, each individually different subject matter is a major area, and as such is likely to have its own density in the negative, different from the densities of the other subjects in the composition.

Back to our example again, we notice a group of densities with an extreme range of brightness. The five areas have recorded the brightness extremes of the subjects as illustrated in Figure 13.

Immediately we sense a "contrasty" negative. The sky is dense. The foreground and house areas are thin.

As the light comes through these five areas, we can sense that we are looking at five major areas of similar densities. We can also sense that the entire negative consists of five different little neutral "masks," organized into a larger area, with each unit of "mask density" controlling the amount of light it allows to pass through. The heavy area allows only a very little light to pass through itself. The thin area allows too much light to pass.

Since the light source is constant, these five units of dissimilar densities split up and divided the amount of light into certain fractions of its original power. It is the light that does the printing. The negative merely acts as a "regulator" of the light. And the smaller divisions of densities are "individual regulators."

If these "individual regulators" are related to each other, the "opposite values" they create, as a print, will also be related to each other.

As we look at our example negative, we can see that the printing potential between two densities is so great that it would be impossible to register them on paper without dodging one section and burning in another.

Now our seven-step scale is brought into action.

Comparing the visual effect of the five areas of the example negative, Figure 13, they compare to the scale as shown by Figure 14.

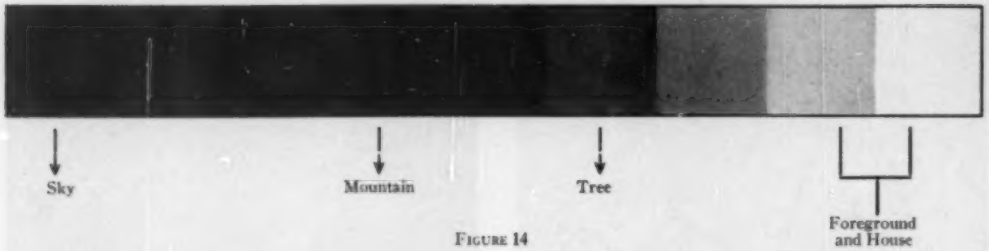


FIGURE 14

In analysing a negative, forget how it will print, but look at the densities as though they were grays.

Now, if you remember what was said about densities reversing themselves in the print, you'll quickly see by the gray scale comparison just what will happen on paper when printing from a negative that indicates such extremes of opposition.

Remember also what was said about middle grays as pivots around which all densities revolve? How then will the tree and the mountain area print on paper?

If we were to form a gray scale group of values, placing the five areas together and side by side, we would have a visual characteristic of discord and lack of harmony or a balanced pitch of contrast as found in a gray scale.

Since the tree area and mountain area are the only densities that compare with the "pivot" section of the gray scale, they will print very well. All other densities will only reverse their order around that "pivot group" and be just as contrasty in the print as they were in the negative.

When doing control processing of any sort with a negative of this type, the problem is to thin out dense portions, while increasing densities of thin portions, so that all densities are related harmoniously to each other. The illustration in Figure 15 shows the direct consecutive relationship between densities that make for good printers.

Note how all five areas seem to fit together in jig-saw puzzle fashion, just as the same consecutive number of grays fit together as a scale.

Remember that densities do not have to appear, nor fit together, exactly as they do in the gray scale. That is not what I am preaching. What I do insist upon is cultivation of this type of analysis in the effort to recognize when areas are in harmony with each other and when they are in discord. Negatives without harmonious areas will not be successful printers.

We have nearly concluded the most important part of negative analysis. We have tried to show how a negative can be divided into sections, and that each section is part of the composition design; that each section is, in itself, a unit area, typical of some subject of our picture; that each of these unit areas is usually of a different tone of gray.

The fact is that all subject areas must be printed in their own relative key, and must not be printed as light or as dark as another key subject, otherwise we cannot tell where one subject ends and the other begins. So, if contrasts can be made to be seen in harmony, just as the same number of gray scale patches can be seen individually, we will have accomplished a balance of quality in both our negative and print.

Detail and Texture

If it is possible to print seven distinctive gray values, then it is also possible to print a negative that has seven

FIGURE 15

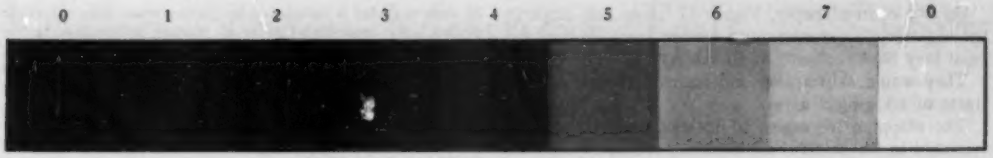


FIGURE 16

areas of similar density. If you can show seven different subjects, with each subject having the same ratio of contrast as illustrated by the sample scale, Figure 11, you will have reached the limit where the print will not show any more beyond the white and the black.

If those seven areas, or values of gray, are visible in the print, it is obvious that all other in-between values will also be visible, but not with the same degree of contrast. The in-between values are the detail and textures that show within those seven areas.

It all boils down to this: you cannot print for texture and detail unless you can print for the key value, or gray scale value, of the subject itself. Then the textures of the principal areas, or subject divisions, will show as miniature gray scales themselves. All key areas will have ranges of tiny blacks, grays and whites within their outlines, but all these variations of gray will only occupy a proportionate amount of space, without affecting the key of the area.

We are actually back to the black cat and the white bottle of milk!

When those key areas print with detail within their jig-saw puzzle boundaries, all such areas, printing in relationship with each other, will give the illusion of a long range, or, as we like to call it—print quality.

Actually, there is no such thing as a long range. It is a limited range. But it can be made to appear long if those "cubes" of gray are organized to fit the volume space of the paper surface, just as the limited number of wooden cubes fit into our large box.

Negative Image Relationships to Prints

Just a few paragraphs ago we talked about a "relative number" of grays. That "relative number" is what we want to see in our negatives.

Let's compare it in this way:

The "pitch" or contrast of each gray of the seven step scale can be accepted as having one full step of contrast between each value.

There is a certain "jump" from one step to the other.

The negative that made the print of the scale had relative contrast, or a relative number of steps, but the "pitch" of each step did not necessarily have to be as great as that in the print. In fact, it would be undesirable to have such pitch in a negative. So we try to work with negatives that have less pitch or fewer contrasts, but with the same relative number. We have the same number, or "relative number," but the steps are not as steep.

Why do we want such characteristics in the negative? Well, it goes back to our original discussion about the reflective power of paper surfaces. The grays must be stretched apart a bit before the eye can see the contrasts between them, because of the paper's weak "light source." And we must give the paper a chance to stretch these grays and still remain within the range of black and white.

Let's take our landscape illustration design (Figure 12) again. As a negative, instead of each area 1, 2, 3, 4, and 5 having density values of the scale in full steps, suppose it had only one-half steps, as for example:

The Sky as Density	#1
The Mountain as Density	#1½
The Tree as Density	#2
The House as Density	#2½
The Foreground as Density	#3

Notice that the "relative number" have less contrast in the negative, including one-half step densities, or tones, which lie in between the full steps.

If our negative had the above half-step contrasts within each subject matter, and we used it to print on #1 contrast of paper, we would get a print in which the contrast steps would be duplicated, but reversed in tone, of course. The print would be classified as flat and muddy.

Now an interesting thing happens.

Switching to a #2 contrast of paper, Figure 16, the "stretch" begins to be noticeable. From one-half step contrasts of the negative, the print shows full steps of "stretching." Remember the reverse position of all tones of a negative and you'll follow the comparisons easily.

The Sky May Print as Tone	— #5 of the Scale
The Mountain as Tone	— #4 " " "
The Tree as Tone	— #3 " " "
The House as Tone	— #2 " " "
Foreground as Tone	— #1 " " "

FIGURE 17: # 3 Paper Stretch of the Original ½ Step Contrast of Negative

On #3 contrast paper, Figure 17, those half steps in the negative may stretch much farther apart, so that our print may have contrasts of all subjects.

They would skip a step and increase the visual contrasts of all subject areas.

The skipping of values to increase contrast can be tolerated in the print, if all tones are relatively uniform, but this uniform skipping cannot take place if it wasn't in the negative to begin with. As long as the density contrasts of negatives are related to each other, we can stretch them proportionately and harmoniously on sensitive papers to any degree we wish, just by the selection of a contrast grade.

Can you imagine how negatives would print if they compared in contrast to the initial example of this landscape design, Figure 13? Let's analyse that particular condition with the gray scale.

All subject matter already "stretched" as a negative to the limits of the paper, will stretch beyond those limits when printed. The sky, already too white in the negative, and the foreground and house, already too black, will stretch beyond the paper scale. The tree and mountain will also "stretch," but they will remain within the paper range. They will be the only two harmonious densities that will reproduce faithfully in the print.

The above explanations intend to show the necessity of obtaining harmonious density ranges in our negatives besides proper relative gamma in order that the "tonal-stretch" that takes place in the print, remains within the paper range.

We may never experience such ideal negative conditions as given here in theory, but for the purpose of illustrating common behavior of contrast between negative images and the resultant positive deposits on papers as prints, the theory is sufficiently exacting to promote analysis of any negative image by means of the gray scale.

(To be continued next month)

JOHNNY APPLESEED'S CORRESPONDENCE

Rochester, N. Y.

DEAR JOHNNY:

In your column on flash you asked for additional tips to pass on to your readers. Here is one I picked up at the 1950 PSA Convention in Baltimore.

My flash gun was firing about 1 time in 3 attempts. My first inclination was to blame the batteries, but new ones didn't help. All wiring connections were found to be OK. A PSA member then showed me that almost 100% consistent flash could be attained by sanding, filing or scratching the contact point on the end of each bulb base. It really works.

Apparently, bulb manufacturers coat most flash lamps with a transparent lacquer to hold the glass intact if the lamp explodes, and fairly frequently the lacquer coats the contact point too. This lacquer acts as an insulator, preventing flow of "juice" to the lamp.

I understand that many press photographers attach sand paper to their cameras and brighten the contact point on each lamp before use.

As a result of the article "Your Club Needs a Color Course," written by Charles Kinsley and me and published in the September JOURNAL, I recently had some correspondence which may interest your readers.

Miss Lucille Pilcher, of Eureka Springs, Arkansas, wrote to say that she has had considerable trouble with not being able to tell on close-ups what is included in her picture when using her 35mm camera. She inquired where to get further information on the framing device pictured on page 499 of the September JOURNAL. In answer I sent her a pamphlet titled "Kodak Portra Lenses and a Technique for Extreme Close-ups" which I had obtained free from the Sales Service Department, Eastman Kodak Company, 343 State Street, Rochester 4, New York. This booklet is free upon request. It tells how to make and use a frame of the type mentioned in our article.

My reply did not fully solve Miss Pilcher's problems. She asked for an easier way to make close-ups and a means for knowing what is in her picture.

There are two other ways, as far as I know, to accomplish the same result:

1. There is a "Pony" Bantam spool carrier available for some of the roll film cameras. Where this can be used in a reflex camera, it is possible to work fairly close and to know almost exactly what is in the frame.

2. There are 35mm and Bantam adaptor backs for use on sheet film cameras. They provide a most accurate means for photographing close-ups.

I suggest that you prepare an article sometime covering this whole problem of close-ups on 35mm film.

JOHN G. MULDER, APSA

DEAR JOHN:

Thanks for your comments. Our schedule is complete now for several months, but your suggestion will be added to the list of topics for the future.

JOHNNY APPLESEED, APSA

* * * * *

Rochester, New York

DEAR JOHNNY:

The following is a comment on a statement in the October 1950 JOURNAL, page 542. A pola-screen won't help control reflections unless used with polarizers at the lights. In any case, a pola-screen at the lens can't control reflections of the camera itself.

If the man (Carlisle) is trying to photograph 3x6" cards, a +3 Portra won't give a field small enough. A 2+ and 3+ together would be better.

JOHN W. MCFARLANE, FPSA

* * * * *

South Africa

DEAR JOHNNY:

Thanks for your letter of the 4th August (published in the October PSA JOURNAL).

Viscose sponges. Yes, always wet or too much washing tends to disintegrate. And when that begins you better buy a new sponge. As a matter of fact since mine did disintegrate after years of use under the camphor treatment I have not used one. Just sprayed my film with the bath spray and hung it up, after proper washing. It seems to be OK. Maybe waters with a heavy mineral deposit would leave their traces. A final bath and rinse in a tank with a wetting agent like Aerosol would be another alternative to the sponge.

Development. Now, how do I say if it is to be 60 or 90 minutes? Just by the name of the film. If it is a Super-XX then it is 60. If it is Panatomic-X then it is 90. But you must realize that I am not overly particular for a few minutes more or less. One day I forgot them and I got busy taking some more portraits. They stayed there 150 minutes but were quite OK. And the same thing goes for other films. The secret, of course, is the lighting. With press films I cut down the time to 40 or 45 minutes. I use 60 minutes for the Arrow Pan and 90 for the XF. You say that 90 minutes is 50% up on 60 minutes. But it isn't! I am no chemist, but I believe a curve of the rate of development would start at nil whilst the liquor is percolating to the emulsion, then climb right up and then, after a little, begin to level off until it finally stops. Just when it stops I do not know and do not worry to know. But certainly long before you get blackness.

(Turn to page 28)

Make Your Movies Tell a Story

HARRIS B. TUTTLE, FPSA

IN THIS ARTICLE some of the factors that must be taken into consideration to make a motion picture story will be discussed. The still photographer who makes a single picture usually wants his picture to tell a story. The commercial photographer may want to tell his story in a single picture, or it may be a subject of such a type that a sequence of pictures is required (Fig. IA, B, C), each of which bears some relationship to the other; but in their entirety they, too, tell a story. The lecturer, teacher, or documentary photographer also tells his story with a sequence of related pictures.

The motion picture photographer enjoys a unique position in photography, because most motion picture scenes mean little when viewed separately. It is when a series of related scenes are joined together that a motion picture story results.

There is one unique distinction between a motion picture and a still picture, which was adequately expressed by Oscar A. Depew when he said in a recent article: "I had not quite broken away from still photography enough to realize that movement was the chief function of a motion picture." A motion picture should first and foremost contain movement.

The principles of story telling with pictures can be applied to either the still or the motion picture camera, because after all the camera is merely a tool through which we express our ideas—a means of communication.

There are several factors, however, involved in making a motion picture or a sequence of still pictures which might be considered as the tools of the artist. They are the implements or techniques with which we fashion into picture images the story ideas we want to convey.

Therefore, in order to save as much time as possible, we are going to assume that you are more or less familiar with terms such as "long shots," "medium shots" and "close up," "perspective lighting," and other related factors and techniques.

There is one other item that should be mentioned briefly, and that is *continuity*. Continuity is merely a progressive revelation of related steps in the event that is taking place. Sometimes continuity is just as simple as the action might be. One scene or one picture logically leads to another. The effective use of continuity provides the photographer with one of the most forceful factors in the making of a picture story.

To obtain continuity, one does not need to photograph scenes in sequence. Once a picture story has been planned, the last scene can be filmed first and the first last. It is by the processes of editing and arrangement that pictures are finally assembled into a story having continuity.

Once we have a story idea for pictures, the logical order in which the various steps are presented automatically provides us with continuity. We automatically sense when continuity is wrong, because in such cases the cart is hitched in front of the horse instead of in back of it. However, through the medium of the motion picture it is possible literally to hitch the cart in front of the horse and produce a certain dramatic or emotional effect which could not be achieved in any other way. We must be

Fig. I-A, B, C. This series of three pictures are related in that they show a little boy going fishing, baiting his hook, and the close-up of him and the fish he caught.

careful, however, not to introduce a jarring note or misdirect the train of thought of those viewing the finished picture.

In making a picture story of any type, the angle covered by the camera lens should include only the focal point of interest. Any action or movements shown in a motion picture should have a definite meaning. When a picture includes detail that has nothing to do with the telling of the story, or if any action is recorded that has no relationship to the action of the story, the person observing the final picture may be confused, and the picture or the story will not be clear. Therefore, the person making the picture must have a fairly clear concept of the story he wants to tell and be able to visualize in advance what the finished picture will look like, and what mental effect it will have on the audience.

Normally, in introducing a new locale the first scene or picture is a long shot to acquaint the audience with the general atmosphere or location in which the action is taking place. The next scene is a medium shot to direct attention upon the subject of chief concern. The next scene is usually a close-up of the object or person on whom we want to direct attention. You have probably observed this progression of scenes often in many of the professional motion pictures seen in the theaters. You might refer to this arrangement of scenes as a conventional continuity or sequence.

With the motion picture it is possible to reverse the sequence—to put the cart ahead of the horse. For example, if we were to start out with a closeup of a hand inserting a key into a lock, slowly turning the key and carefully turning the knob, anyone viewing the finished film would be immediately impressed with the mystery involved and would wonder whether the hand turning the key was that of a man or woman, whether it was a man trying to sneak in his own home in the early hours of the morning, or a burglar or murderer gaining access to a house for evil purposes. The next shot might be a medium view of the doorway, showing whether it was a mansion or a run-down farmhouse; and also what the chief character looked like—whether it was a man, whether he was well dressed, or dressed like a tramp or burglar. A long shot of the building now would show its location, whether it was isolated in the country or nestled among other houses, and whether it was in a wealthy or slum area.

This letter treatment of continuity or sequence of scenes is one that is frequently used in mystery dramas, and you can see from this brief description how this method of presentation can heighten the dramatic values and mystery that surround the circumstances.

I hope that the description of these three scenes and the possibilities suggested, as to the motives of the key being turned in the lock, may already have started you thinking; and I am willing to bet that you could start at this point and develop several very interesting stories, all starting out with the same general scenes but each leading to a different conclusion.

One other important factor, which is of vital significance in story telling with pictures or making your pictures tell a story, is *imagination*. The person who is gifted with imagination will, of course, have ability as a story writer, and he might imagine any sequence of events taking place which could be either humorous or dramatic. In making pictures, either still or motion, one must develop his imagination and be able to imagine not only what the finished picture will look like on the screen, but also what effect that picture will have upon the audience.

Lighting, too, is an important adjunct in telling a story with pictures. Since the subject of lighting is tremendous in itself, we will mention only briefly that lighting is just another tool, like perspective and close-up, which can be used to heighten or lessen the dramatic intent of a scene. In making the close-up of the key being inserted in the lock, if the lighting is very subdued so that the door, the key, and the hand all appear dark, the impression is that the event is occurring after dark; but if the door, hand, and key appear fully lighted, then the impression is that the event is occurring in the daytime (see Fig. II). If, on the other hand, the person unlocking the door is holding a small flashlight and the area of the lock is illuminated by its beam of light, then the impression would be that it was a burglar trying to get in (see Fig. III).

The mystery and dramatic value could be heightened still more by the kind of key that was inserted—whether it was for a modern Yale lock or for an old-fashioned brass-key lock; also by whether the hand was that of an aged person or a young person—whether it was knarled and worn with work or well manicured with expensive rings on the fingers, or whether it was deformed or maimed in any way.

Each of these factors can and does stimulate the imagination, not only of the person planning the picture but of the person seeing it. That is why one must have imagination not only to visualize what the finished picture will look like on the screen, but also to foresee what its effect will be on the audience.

A Bicycle Story Idea

Let us take a simple idea and develop it into a picture sequence that tells a story. Let us select as our subject a simple title like "Johnny Wants a Bicycle," because there must be a number of movie makers with children, who have at some time or other wanted a bicycle. For the benefit of families where there are no boys, we might assume the title to be "Mary Wants a Bicycle." There are literally hundreds of thousands of subjects that might be used as titles, such as "Mary Wants a Doll," or "Billy Wants a Ball and Bat." Anyone who has raised or lived in a growing family knows very well the endless things that are always wanted or needed by some member of the family. That is another reason for selecting this title, because the same principle can be applied to so many other things.

Your attention is called to a similarity between this title, "Johnny Wants a Bicycle," and one of the basic ideas that is used in a large number of Hollywood productions; namely, that of "Boy Wants Girl," and this develops through the Hollywood technique to Boy Meets Girl, Boy Gets Girl, Boy Marries Girl.

Using the Hollywood formula, a plot is developed to have boy meet girl in an unusual manner, either by saving her life when she falls overboard from a yacht, or in some other dramatic manner. Then the Hollywood writer de-

Fig. II *(Left)*. The effect of soft sun lighting indicates the picture is made in daylight. Fig. III *(Right)*. The spot light effect indicates the use of a flashlamp at night.

velops the plot by putting a number of obstacles in the way making it difficult for the boy to get the girl; but after our hero has surmounted all of these obstacles he finally gets girl and marries her.

This simple formula, which can normally be made in 100 feet of home movie film, usually is developed into eight to ten reels of 35mm film.

Let's get back to Johnny and start developing this idea. Let us assume that Johnny is a ten to fourteen-year old boy who has never had a bicycle and wants one very badly. There are probably two factors which naturally arise from this situation which will fall under continuity —Johnny gets his bicycle and his glee in receiving it. We want to make sure at the onset that this story is about Johnny, and we don't want to end up by showing the family's glee at his receiving it. While the family's enthusiasm can be shown in a subtle way, the main emphasis should be on Johnny. Just using these three headings, let's see what we can develop in the way of a story sequence, and let's consider the sequence in its logical continuity.

First of all, we must establish in the picture that Johnny doesn't have a bicycle and that he wants one very much. This might be accomplished by showing Johnny playing with three or four other boys who do have bicycles, and after they are through with their play, have them get on their bicycles and ride off, leaving Johnny alone (see Fig. IV). Perhaps when they run over toward the bikes, Johnny might affectionately touch one of the wheels, and perhaps you could make a close-up of Johnny's face showing a wishful expression.

We might next have a picture of Johnny looking into a window of a bicycle shop with his big wide-open eyes looking at every shiny part of the wheel (see Fig. V). You might even have him enter the store and feel of the handlebar grips and of the springs under the seat with the same expression of longing that is characteristic of boys in such circumstances. You might switch now to a picture of Johnny's mother receiving some mail from the postman. She opens one of the letters, and folded inside is a check. She reads it, and while she is reading it, a close-up is shown of one paragraph in the letter in which it says something to the effect that "since this is Johnny's 10th birthday and I did not know just what to get him, I am enclosing a check for $30 and suggest he get whatever he wants or needs most," signed Uncle Bill.

There might be a sequence of scenes now in which the family tries to make sure just what it is that Johnny wants most, and at the same time keeping the check a secret from him. After his mother has read the letter, Johnny might return home and his mother might send him to the store on an errand, telling him to hurry back. Johnny might then show her a picture of a folder of bicycles, and state by use of a title that if he had a bike he could ride down to the store and be back in a jiffy. While Johnny is at the store, his mother might go to his room, where on the wall he might have pictures of bicycles cut from catalogs.

All of these little details shown in pictures help to establish the fact that Johnny definitely wants a bicycle more than anything else in the world; and, of course, the audience knows something that Johnny doesn't, and that is that he's going to get the bicycle.

At this point it would be possible for Johnny's mother to merely go to the store where Johnny had windowshopped and buy a bicycle. It might make the film more interesting if his mother was to consider buying some of the other things that she knows Johnny needs more urgently than a bike. One's imagination can go practically any degree, and it might be possible to go too far and put too much emphasis on this sequence. This, of course, would be determined somewhat by the other factors affecting the picture. If Johnny and his family are of moderate circumstances and the purchase of a bicycle is really a luxury, then one or two scenes of the mother considering necessities would be appropriate. If Johnny, on the other hand, comes from a wealthy family, there is no problem at all of necessity or need, and the bicycle would be the one thing that mother would buy with Uncle Bill's money.

At this point we can see need for careful planning. What impression is the audience going to get? First, if in the first scene it is obvious that Johnny comes from a wealthy family, there is probably no need for wanting a bicycle because he would probably already have one. Therefore, we must assume that Johnny comes from an average family, and this fact would be portrayed in all the subsequent scenes.

Fig. IV *(Left)*. Johnny is left alone by his pals. Fig. V *(Center)*. Johnny wishes he had a bicycle. Fig. VI *(Right)*. Johnny's surprise and happiness over receiving a bicycle for his birthday.

Rather than to dwell too much on Johnny's mother considering other merchandise, it might be better to divert our attention back to Johnny, who after all is the star, and make a sequence of scenes of all the things Johnny might be doing to buy a bicycle for himself. For example, he might see a sign in the telegraph office window, "Boy Wanted," and he might apply, only to be turned down because he didn't have a bicycle. Or a slightly different twist could be given to the story by having a sign read, "Wanted, Boy with Bicycle to Deliver Messages." The same sort of sign could be in the window of other stores where boys are wanted, but in each case the boy must have a bicycle.

Regardless of how these situations are handled, we will assume that Johnny's mother buys a bicycle with the check from Uncle Bill and that the bicycle is delivered at the house. Their problem now is to keep it in hiding until the following day for Johnny's birthday.

Scenes can be made of Johnny retiring the night before his birthday and of his father and mother getting the bike out and standing it up on its standard in the living room so that it will be easily seen by Johnny when he comes down for breakfast. A title could indicate the passage of time by merely saying, "Next Morning," and there could be a scene of Johnny awakening, brushing his teeth, and combing his hair—then a flash-back to mother downstairs moving the bicycle perhaps just one-half inch to make sure it will be in line with Johnny's vision when he comes downstairs—then a close-up of mother calling to Johnny, indicating by inserting a title, telling him that breakfast is ready—and back to a scene of Johnny putting down the comb and brush and adjusting his tie.

It might be possible now to place the camera so that the lens is looking through the spokes of the wheel toward Johnny, or the handlebars of the bike might be in the foreground. The main object is to have the camera in such a position that the expression on Johnny's face registers his happiness when he first sees the bike, and his reaction as he runs over to it (see Fig. VI). The picture could end with mother helping Johnny get his bicycle out the front door, and just as Johnny rides down the driveway, his three comrades who appeared with him in the first scene of the picture come riding by and stop to give an admiring touch to Johnny's present. The picture could end here, or if Johnny was a really poor boy to whom a bicycle was a luxury, the next scene could be of Johnny's mother going back into the house and picking up some mending. She could start sewing a collar or buttons on Johnny's shirt—then back to a scene of Johnny getting on the bicycle and riding off with his friends.

Here we have a picture story that could be done in as little as 100 feet of film, or it could be slightly enlarged upon so that the story could still be kept interesting and last for 150 or 200 feet of film.

You will note in taking a subject such as this that actually very few titles are required. The basic theme of the story is so thoroughly expressed by the pictures that titling every sequence would be superfluous. It has often been said that a perfect motion picture is one wherein the story is so thoroughly told by pictures that the use of written words is unnecessary. It is not always possible to achieve this condition, but it is possible to approach it by keeping titles at a minimum and letting the pictures themselves tell the story. Titles should only be used to bridge the gap between two separate thoughts or sequences, or to indicate the passage of time.

APPLESEED *(from page 24)*

Density, by the way is rather a function of exposure. Contrast rather a function of development. This is a rough and ready statement of what goes on, I know. Now if you know you are over-exposed, you can try to counter that by underdeveloping. But you don't make a good negative of a bad exposure. You may make a printable one.

The negative I like, and usually get, is a full-bodied negative (I do not like those so thin you can read fine print through the dens areas) and one which will print on normal No. 2 paper. I never use No. 1 paper. I keep a little No. 3 around just in case I have slipped up on my exposure and got a flat negative.

With regard to film exposure, I do not think I vary much from standard.

Outside, for weddings and sports groups I have taken side-by-side with a friend who uses an exposure meter and I found we always agreed on the exposure required for a given shot. I developed mine in my way and he in his. I think I got better negatives. Better dresses on the brides, etc. Better facial contours.

I am very keen on my enlarger. I would not use a condenser machine on any account. I see the cold-lighting is going strong in America. Am I right in thinking that with it they discard the condensers?

I use Agfa 17 developer and replenisher for the films and do not throw it away until it gets very murky. It improves like Port.

R. W. Osborn

Dear Osborn:

Every man to his own technique, as I've said before, if it gives him the results he wants. So, although I can't agree with all your antics, if they give you the results you want you should stay with them.

Yes, as far as I know, the new "cold light" enlargers operate without condensers.

Johnny Appleseed, APSA

Photography under Difficulties*

DOUGLAS A. SPENCER, HON.FRPS†

ON THIS occasion, let me read you a greeting from the Royal Photographic Society of Great Britain. It was intended that this greeting should be conveyed by our friend and colleague, Mr. Joseph Bing. Illness has prevented him from attending and I join with you in wishing him a speedy and comfortable return to health.

Dear Mr. Bing,

I am instructed by the President and Council of The Royal Photographic Society to ask you to be kind enough to convey their best wishes to members of the Photographic Society of America assembled at their Annual Banquet and to express the sincere hope that this function may be in every way successful and productive in full measure of the spirit of friendliness and goodwill which should prevail on these occasions.

My Council looks forward to closer co-operation between our two organizations, in the best interests of the art and science of photography, and hopes that through personal visits and the interchange of photographic work of common interest the ties which already exist will be strengthened still more.

It is my Council's earnest hope that this Convention will have produced many interesting lectures, much fruitful discussion, and most cordial relationships at the social functions which are so invaluable a part of such gatherings.

L. E. HALLETT, *Secretary*

As you know, the R.P.S. is broadly representative of every branch of photography as an art, a science and a hobby. In addition, we have in Britain the I.B.P. (Institute of British Photographers) whose membership is almost entirely professional—men and women who actually earn their living by practicing some form of photography. Their President sends you this greeting—

The President and Council of the Institute of British Photographers send cordial greetings to members of the PSA, in the name of the Professional Photographers of Great Britain and Northern Ireland and on behalf of the Institute's members in the Commonwealth.

All three societies—the the R.P.S., the I.B.P., and the P.S.A. have some major problems in common. Finance, for example. In England it has not been regarded as practical to raise members' dues to the extent that the P.S.A. has managed. And we noted with envious eyes the magnificent response to the "Cornerstone Appeal" launched by your members at the St. Louis Convention when more than 60 members stood up and pledged themselves to special donations of $200 each.

That sort of atmosphere is catching. I've no doubt that if I'd been present at St. Louis on that memorable occasion I should have pledged you $200 myself—secure in the knowledge that Sir Stafford Cripps would never even dream of letting me redeem my promise.

And the problems of size are common both to the R.P.S. and the P.S.A.—the difficulty of retaining the personal touch, of ensuring that the right type of hard-working national council member is recognized when the ballot paper reaches members in distant cities.

Currently, there are two aim points being considered by the R.P.S.—one school of thought would raise the dues and responsibilities of membership to a point where the society would necessarily become small though perhaps remain influential—where membership would be a high privilege.

Another body feels that the aim of the Society should be the largest possible membership with possible loss of status but an income that would enable it to do for photography what your own "National Geographic Magazine" does for geographical research.

Meanwhile, the British amateur photographer himself is having a rough time. If his ambitions do not extend beyond the making of a record of his family and his holidays on roll film—his share of the total production available in the country will not amount to more than four or five rolls of film a year and one roll in three will take the form of cut down government surplus outdated aero film. Last year in England, at least fifty percent of the roll film available was of this type, and, in consequence, many photofinishers altered their processing conditions to get the best result out of this high contrast, stale and often foggy material. This meant, of course, that roll films specially made for amateur work were not processed to best advantage by many photofinishers.

An obvious cure—which, however, the British Government procurement agency would not consider—would be for the Royal Air Force to buy that part of its aero film it doesn't intend to use, in the form of Verichrome and Selochrome, and then dispose of this as soon as possible after delivery. That way someone should get good pictures on the stuff anyway.

And if the British amateur wants to make color photographs and asks his dealer for a roll of Kodachrome, the typical response is a mad peal of laughter for the large majority of the Kodachrome produced in England goes to professional, industrial or export markets.

However, such shortages are not as bad for us as you might think. They tend to discourage indiscriminate snapshotting—the piling up of collections of black-and-white or colored platitudes. You think before you press the button, you learn to estimate exposures properly, you process your films with care, and you consider before printing which type and surface of paper will suit the subject. Paper is not in such short supply but even here interesting proposals for economy have emerged. One example is the suggestion that the present range of sizes should be replaced by a new series whose sides would be in the proportion of 1 to 1.4. When paper of this shape is cut into half, the two pieces are the same shape as the

* Excerpts from remarks at the Annual PSA Banquet, Baltimore, Md., October 21, 1950.

† Past President, Royal Photographic Society, London, England; Deputy Managing Director, Kodak Ltd.

original. If, therefore, the amateur bought his paper in size 10 by 14-inch or 12 by 17-inch, which are in this ratio, he could by repeatedly halving make as required a whole range of aesthetically pleasing sizes without cutting material to waste. This idea has been widely canvassed with enthusiastic response from amateurs but with a tepid reception from the professional workers and the manufacturers.

The latter point out that the system, from their point of view, would involve the introduction of two new sizes—an impractical proposition under present circumstances unless two existing sizes are dropped. And the professional and commercial photographers who take the bulk of the paper are apparently unwilling to sacrifice any of the small range of sizes which are currently available. At the request of the amateur photo press in Great Britain, the proposal has now been referred by the British Standards Institution to the American Standards Association for their consideration.

The manufacturer's production difficulties are well realized by the public in Great Britain; manufacturers have seen to that. Many interesting proposals are made to them in this connection. A current example is a letter received by my own company.

Gentlemen:

In negotiating with a contractor for the removal of a skylight in our home we have been advised that your company is interested in procuring this type of glass for the manufacture of filters. The skylight we anticipate removing is composed of three sections with an overall size of approximately 3 feet wide by 12 feet long. We should be obliged if you will let us have your best offer for the glass.

Nowadays, every British amateur photographer worth his salt, and even the few unsalted ones that remain, look twice before they fall for some gadget that is supposed to make photography easier and usually merely make it more expensive. Living as they do, in a planned economy—where everything is planned except the economy—they have to do the economizing themselves. They console themselves by comparing such unnecessary luxuries with diplomats. You know—the people who are appointed to deal with situations that wouldn't arise if there were no diplomats.

To summarize, shortage of equipment and materials has not lowered the will to photograph in Britain, but it has made it more discriminating by discouraging aimless snapshotting—and my own upbringing makes me sympathize with this tendency towards significant photography—photography with a purpose. It began with my own father's lack of interest in unnecessary portraiture which was understandable. You see, my grandfather was a user of the early and very slow Calotype process. He would set up his camera in the garden, plant my father in a chair and tell him to keep still. Then he'd uncap the lens and say, "You're not to move until I come back." Then the old gentleman would go away and have his lunch and perhaps a nap. Returning, he'd cap the lens and, when on developing the negative, it showed clearly, as it always did, that my father *had* moved—he'd get his ears boxed—thus adding insult to injury.

I've been taking photographs since childhood but for many years my choice of subjects was largely determined by what was immediately in front of the *lens* at the moment when I pressed the button. This proved, in a large number of instances, to be my middle finger.

I recall, however, a fine study of a water barrel apparently caught in the act of dashing across the backlot and a telling shot, with an Orson Welles touch about it, of my father's knees against a background of trash cans. These, however, were merely dull records and my first lesson in Steichen's art of making the commonplace interesting to others came from, of all people, the sexton at my parish church. It was a very dull church but people were always taking views of the interior and I asked him why. He proceeded to show me the wooden altar rail, flanked by stout posts with large wooden knobs on top. No one apparently thought of photographing the setting until the sexton explained that a short while before we had had a visit from a very short-sighted bishop and he had confirmed one of the knobs.

That set my mind working—it opened up a vista of endless possibilities. To make a dull picture of a bridge interesting all one had to do was to push someone off it—you then got a special rate from the Sunday papers. You might photograph an empty house and then murder someone in it, and so on. There seemed no end to the possibilities—except perhaps the electric chair.

Of course, this basic idea is not new. I saw sometime ago that an American amateur rang up a newspaper office and offered them exclusive reproduction rights in a street accident photograph. He said it was an excellent shot—the injured woman on the ground and the spectators all gawping at her. Asked how he came to get such a good view, he explained, "Well, I always carry my miniature with me in my car and when I hit this dame. . . ."

In conclusion then—and on a more serious note, we are all very conscious in England that every time history repeats itself the price goes up. We have currently committed ourselves to devoting at least ten percent of our national expenditure to re-armament. So have you. Whereas, however, it seems likely that this unwelcome addition to your budget will at most involve temporary and relatively minor setbacks to your high standard of living—we, unfortunately, have no reserve of either wealth or energy on which to call. That ten percent is bound to lower our standard of living and means a step back towards the austerity of the war years.

There is some consolation in the fact that re-armament should take our two countries safely past that point in our relationship where there seemed to be some confusion between American aid and American succor.

In these more austere circumstances, photography as a hobby in England will almost certainly remain in the doldrums—at least as far as volume is concerned. Photography as a 20th century tool for tackling 20th century problems will, however, become an even more vital weapon in Great Britain's armory. Moreover, as the one truly international language it still has much to contribute to the job of bringing the nations of the world together in friendlier understanding, and the strengthening of the links between the P.S.A. and the R.P.S. is one obvious step in this direction which is immediately before our eyes.

THE FOLIO Volume 4, Number 1

Devoted to News of the Pictorial Division of the Photographic Society of America

Creative Expression Through Photography

Of all the exceptional personalities at the recent Baltimore Convention, I think the one who impressed me most was Maurice Tabard, the PSA member from Paris, France.

An outstanding photographer in fashion work, a master of solarization, he was, nevertheless, humble and modest and eager to help every photographer there. He has an exceedingly brilliant mind, as was indicated by his challenging presentation of the importance of dynamic symmetry in all forms of art, but it is his comments on photography and art that I hope will convey to you, in some small measure, the true personality of this man.

Possibly because the things Maurice Tabard said about the relation of photography and art so well expressed my own personal feelings and convictions, they made a deep impression on me. I hope his comments and some of my own will give readers the challenge he gave to me.

Mr. Tabard started by defining photography as "the spontaneous creation from physical and chemical action of light." This is the basic concept. It makes no differentiation between the possible effects of this physical-chemical phenomenon. But the effect of this phenomenon is what determines whether or not it is Art.

For if you would create with photography as the tool, Mr. Tabard says, "Photography masters you, you do not master photography. In interpretative photography, you have to listen to photography before you listen to yourself."

But to further develop the concept of photography as a tool of artistic expression, Mr. Tabard continued, "Everything (in art) started with poetry, we call that exaltation of nature. Any work of art must be more than a document."

Art, as we know, is the expression of emotion. Art takes many forms—sculpture, music, painting, poetry—and photography. If our photography expresses an emotion, and *more important*, if it causes a similar emotional response in each viewer, our creative work is truly art. Maurice Tabard said of his own creative work, "I believe that in solarization I have found the way of expressing myself."

To the extent that we can convey our deepest feelings and undiluted emotions through photography, to that extent we are true artists. It does not come easy, that ability to convey emotion, and the paths of photographic expression are many and varied. For Maurice Tabard, it is through solarization. For others it may be through softly diffused atmospheric effects or through wire-sharp glossy prints. Each must find his own way.

No, the ability to convey emotion does not come easy, for even Mr. Tabard voices some doubt about his own photographic expression when he says, "I am not too sure, because if a good artist is really good, he never knows exactly where he is going. He starts near the end of his life to realize his work."

Are you realizing your maximum creative potentiality through photography? To be an artist with photography as the tool, one must first be emotionally aware. Then, to convey the emotions felt, one must have adequate technique. The artist-photographer must continually work to better use his photographic tools. Maurice Tabard summed this up when he spoke on the importance of his research in dynamic symmetry—a minor artist uses only his instincts in creating, a major artist combines instinct with continual research to better his work and the use of his tools.

True, Pictorial Division membership helps to train you in better techniques, but you must work and feel and work some more to be a truly major artist through photography. This is a time for resolution and for self-evaluation. What do *YOU* want to accomplish this year? And how can you accomplish your goals? Is photography your creative tool?

STELLA JENKS

Star Exhibitors

New PSA Star Exhibitors and advances in ratings since the last published listing are as follows:

New 1-Star Exhibitors

Yoshio Noma	Seattle, Wash.
Wellington Lee	New York, N. Y.
William E. Bush	San Luis Obispo, Calif.

New 2-Star Exhibitor

Dr. Robert F. Edgerton	Rochester, N. Y.

Advanced from 2-Star to 3-Star
Howard E. Foote — New York, N. Y.

Advanced from 3-Star to 4-Star
Eugenia Buxton — Memphis, Tenn.

Applications for Star Exhibitor Award of Merit Certificates should be addressed to Warren W. Lewis.

Miss Evelyn M. Robbins, *Associate Editor*

I wish you could all have been at the Baltimore Convention! Truly it was wonderful.

Eldridge Christhilf was in the Portfolio Room to greet us and make us feel right at home. He had on display some very very fine portfolios—foreign ones and also the new Miniature Portfolio.

Of course, you just couldn't leave without signing the register for portfolio members (you will find the list of members present elsewhere in this column). It was fun to look up your own portfolios to see what other members might be present—then go out and find them for a good old gab fest.

It wasn't anything unusual to have someone walk up to you and greet you with a "Hello, there! I've been looking all over for you." It would be a fellow portfolio member, that you had heretofore known only by correspondence. Imagine the excitement of that first meeting! Yes, and you can probably also imagine how we would all start talking a mile a minute to catch up with the news of our portfolio.

Every once in a while someone would come up to you and ask if you knew so-and-so who happened to be in their portfolio. If you did, you took them in tow and hunted up that person. Yes, it was fun to be on the other side of the fence, too, to see both their faces light up when you introduced them.

There is just nothing like a portfolio to get PSA'ers acquainted!

Paper Contrast

There is one thing that appears repeatedly in the comments written by the individual members of a portfolio circuit, as well as the Commentator. There will be several comments on a print advising that it be printed on a grade contrastier paper—usually even giving the grade number. The odds are very certain that on the next time 'round the maker will state that it was *already* printed on that grade paper.

How can we expect others to help us, if we withhold some of the most vital information? We can't expect them to be mind readers, any more than we can do so ourselves. They, too, would like to comment on their fellow-members prints as intelligently as possible.

I'm sure that when they put in that line on the print folders asking for the "Paper," they wanted us to give all possible information on the paper we used. We should give the grade as well as the surface and name of the manufacturer.

If, when we fill out those print folders, we will just take an extra second or two to give full information, including the contrast grade of the paper, we will save our fellow members (and especially our Commentators) precious time spent in wondering how to advise us. We will be helping ourselves, too, because it doesn't tell us a thing when they all say our print is "flat"; and then advise us to put it on exactly the grade paper we've already printed it on.

"Star Dust"

A column devoted to the "Wit and Wisdom" of the Stars as taken from the Notebooks in the Star Exhibitor Portfolios.

By Roy E. Lindahl, Gen. Secy.,
PSA Star Exhibitor Portfolios

Last month we left John Hogan right in the middle of his remarks about the judges and the artists, and we find that he continues the lively discussion with:

Of course, the artists are no better when judging their own kind of art. I remember the prize winning painting a few years ago in Pittsburgh of a tramp steamer going down at sea. The ship didn't look like anything I have ever seen, and I have seen plenty, it wasn't sinking naturally, the waves were not possible, the clouds were all wrong, and out in a small boat was a guy standing up with his arm in the air saying farewell to the old tub, which had an ordinary American flag flying at the stern! Why he didn't fall overboard is a miracle, and there were two men rowing, one pulling forward on one side and the other pulling backwards on the other. This was the stupid piece of tripe that took the big cash first prize and all the critics raved about the intense drama and feeling and so on, ad nauseam.

They can't see a real painter of the sea like Winslow Homer, who painted stuff like it actually looks, and caught the real feeling of the sea as it is known to people who sail it, until quite a while after he is dead. You can have your artists to judge photographs (and there are some good ones) but me, I'll take baloney. And I'll take our present day salon prints in preference to all the lousy stuff put out in the camera magazines with the heading that these are good examples of the marvelous and thought-provoking work done by these outstanding photographers we never saw in the salons, and never will.

To my mind, the principal weakness of some of the judges, either of photography or art, is that they don't have first-hand knowledge of anything except in the little circle in which they live—what they know is all second hand. When they see a picture that is outside their own experience they don't like it, and their experience is narrow and limited. I agree with Aubrey Bodine that those who will discard a picture for what they consider are errors in school-book composition and overlook the general feeling of the picture, which may be good, are incompetent.

I am also griped by the judge who will pass a borderline picture without hesitation, but will look over a really good picture made by a well known pictorialist as if it is a personal challenge to find something wrong with it, and if he can find the slightest imperfection will vote against it.

It's like an experience I had as a Cadet training for the Air Corps. My turn came to make sure the barracks were clean and in order, and I worked hard all day and turned out a masterpiece of a job. I polished the faucets, cleaned all the finger marks off the paint, scrubbed everything and got everything perfect. The Medical Officer who did the inspecting stood in the doorway and looked the job over for about five minutes; then went straight to a fuse box I hadn't noticed on the wall, opened it up and found dust because nobody had touched it for months. He said I had done a rotten job and would have to do it over again the next day. Again I did a good job, and the Inspector got a step ladder, climbed to an overhead light fixture on the ceiling and found dust on the reflector. Again I was given a dressing down, and told to do it again the next day. This time I said to h—with it, gave it a lick and a promise, left a lot of things half done, and the Inspector gave me a calling down, said do it better next time, and passed it. I never had any more trouble because I always made it easy for the Inspector to find something wrong. There is more than one salon judge who looks on a perfect job as a personal challenge, and he will reject it if for no other reason than it is too perfect.

Next month John relates some of the trials of a salon judge.

PSA American Portfolios

Eldridge Christhilf, Hon.PSA, APSA

Convention time always plays havoc with our release for "The Folio." The convention coming as it does just before our January deadline means that time is at a premium. Just prior to the convention we are busy in preparations, shipping portfolios to be on display, etc. Then on the return from the convention we must dig out from under the accumulation of mail and portfolios that have piled up while we were away. 1950 has been no exception.

The convention was fun, as everyone will agree and those of you who will read accounts of it in PSA Journal will have regrets that you were not there to enjoy the programs, the field trip, etc. It was nice to greet so many of the members whom we had not met before, especially those from the Eastern seaboard who had not attended previous conventions. Unless I am greatly mistaken they will now become PSA convention regulars.

Much of interest came up at the Commentators and Portfolio Members Meeting. The salient points will be covered at an early date in "The Folio." If you missed the 1950 convention, begin to plan now for Detroit, Michigan, in October 1951. Save part of your vacation for the convention and you will not regret it.

Among those who were present and who spent time in the Portfolio Room meeting other portfolio members and browsing thru the exhibits were:

Circle No. 2—Ray Mieso, Milwaukee, Wisconsin
Circle No. 4—Dr. A. W. Biber, Spartanburg, S. C.
Spee Wright, APSA, Springfield, Ill.
Circle No. 5—Harold B. Spriggs, Livingston Manor, New York
Doc Cochran, Chicago, Illinois
Circle No. 7—C. E. Heglund, Jackson, Mich.
Tom Firth, APSA, Trappe, Md.
Ed Palmer, Sioux City, Iowa
Coleman Dixon, Tallahassee, Fla.
Circle No. 8—Isaac Mitchell, Erie, Pa.
Circle No. 10—Charles Ray, Jr., Brevard, N. C.
Sam Levy, Harristown, Illinois
Circle No. 12—Morton Levin, Romeo, Michigan
Circle No. 13—D. Ward Peane, APSA, Chicago, Ill.
Circle No. 14—Paul Schochet, Glenburnie, Md.
Circle No. 15—Phil Taylor, Towson, Md.
R. M. Du Bruyne, Raleigh, N. C.
Evelyn M. Robbins, Springfield, Ill.
Circle No. 16—Victor Scales, Hon.PSA, New York, New York
James Hinson, Waterloo, Iowa

Circle No. 18—Belle McMillen, Lansing, Michigan
Circle No. 19—Evelyn M. Robbins, Springfield, Ill.
Fred L. Pyle, Biloxi, Mississippi
Circle No. 20—Lee A. Ellis, Waban, Massachusetts
George J. Munz, Bergenfield, N. J.
Circle No. 21—Frank J. Heller, APSA, Bartlesville, Oklahoma
Circle No. 23—Esther Wy, Washington, D. C.
Circle No. 24—Robert Lauer, Milwaukee, Wisconsin
H. Jack Jones, Montgomery, Ala.
Circle No. 25—Caryl Firth, Trappe, Maryland
Doc Cochran, Chicago, Illinois
Circle No. 26—Ed Palmer, Sioux City, Iowa
Circle No. 28—H. W. Barker, Glenbrook, Conn.
C. Oliver Procs., Hyattsville, Md.
Circle No. 29—C. Elton Heglund, Jackson, Mich.
Tom Firth, APSA, Trappe, Md.
Circle No. 30—Frederic Calvert, Chester, Pa.
Circle No. 31—Arnold Wise, Albany, N. Y.
Circle No. 32—Edna V. Tucker, Utica, N. Y.
Circle No. 34—Belle McMillen, Lansing, Michigan
Circle No. 36—B. Green, APSA, Brooklyn, N. Y.
Doc Cochran, Chicago, Illinois
Circle No. 39—W. J. McCarthy, New York, N. Y.
Stella Jenks, Columbus, Ohio
Gisella Ellis, Waban, Mass.
Circle No. 40—W. J. McCarthy, New York, N. Y.
Elden W. Eichmann, Waverly, Ia.
Circle No. 42—Ed Palmer, Sioux City, Iowa
Circle No. 44—George J. Munz, Bergenfield, N. J.
W. J. Pietschmann, Detroit, Mich.
Fred L. Pyle, Biloxi, Mississippi
Circle No. 48—Evelyn M. Robbins, Springfield, Ill.
A. L. Paschall, Troy, Ohio
Circle No. 49—George J. Munz, Bergenfield, N. J.
Circle No. 52—Dr. C. J. Marinus, APSA, Detroit, Michigan
James Hinson, Waterloo, Iowa
H. Jack Jones, Montgomery, Ala.
Circle No. 53—George J. Munz, Bergenfield, N. J.
Harold B. Spriggs, Livington Manor, New York
Richard Cartwright, Milton, Mass.
Circle No. 54—Robert Lauer, Milwaukee, Wisconsin
Circle No. 58—Dr. A. F. Koch, Waterloo, Iowa
Circle No. 59—Vernon N. Kisling, Baltimore, Md.
R. C. Cartwright, Milton, Mass.
Circle No. 61—Willard H. Carr, New York, N. Y.
Circle No. 64—Charles Ray, Jr., Brevard, N. C.
Circle No. 65—F. S. Stickney, West Caldwell, N. J.
Circle No. 66—Spee Wright, APSA, Springfield, Ill.
Circle No. 68—Newell Green, FPSA, Hartford, Ct.

PSA STAR EXHIBITOR PORTFOLIOS

Circle No. 1—John R. Hogan, FPSA, Philadelphia, Penna.
Caryl Firth, Trappe, Maryland
Cortland Luce, Jr., Atlanta, Ga.
Dr. W. T. Small, APSA, Newburgh, New York
D. Ward Pease, APSA, Winnetka, Illinois
Doris M. Weber, APSA, Cleveland, Ohio
Mildred Hatry, FPSA, New York, New York
A. Aubrey Bodine, FPSA, Baltimore, Maryland
P. H. Oelman, FPSA, Cincinnati, Ohio
Circle No. 2—Tom Firth, APSA, Trappe, Md.
Charles E. Emery, Annapolis, Md.
G. L. Weissenberger, APSA, Keokuk, Iowa
Circle No. 3—Frank J. Heller, APSA, Bartlesville, Oklahoma

DR. GLENN ADAMS, APSA, *Associate Editor*

Straight news stories, such as, A show is on the way from England, or The Southern California Show is circulating in Japan, (which it is not) may be just what the readers of this Department wish. But that smacks too much of reading the list of delinquent taxpayers in your daily paper.

So this month and thereafter, if as few as three guys or gals write and say so, I am going to tell you the news and happenings in the Department of International Exhibits, in the first person—Glenn Adams to you. Fred Kirby, my assistant in St. Louis, and myself have quite a job on our hands. Don't you think we haven't. What with assembling shows here in the U.S.A. and sending them abroad, and writing many people in foreign lands, prodding them into the job of getting their shows ready—we have our troubles.

Fred has the hardest part of the work. After I get the American shows on the water and the foreign show appears at the American Customs, Fred takes over. He is the fellow to write when you wish an exhibit for your club. He drags it down to the post office or sends it to you by express. Then if you do not send it back pronto, he writes you. Another club is probably waiting. But we are both happy to give the members of the PSA an opportunity to see the work of photographers in foreign lands. Besides we get to see the shows first.

Once upon a time there was a $3.00 fee for the privilege of viewing a Foreign Exchange Show in your club. That's out. Now you pay the express charges to and from your city and that's all. Just write to Fred Kirby or to me (address in the masthead). Tell us what you wish and when you wish it, and we will do the rest.

Now for some news—Kay Lindenberg writes from Gotenburg, Sweden, that the American Invitational Show originally assembled for England has arrived in his country and that several of the prints have been chosen for reproduction in *The RSF Meddelanden*, the quarterly publication of the Riksforbjund Svensk Fotografhi. The show will have a wide circulation in Sweden and then be sent to the Royal in London for a stay in England.

The English Exchange Exhibit of 59 prints is on the way to America. Several months ago J. Dudley Johnston, Curator and Hon. Secy. of the Royal Photographic Society, wrote that photography in England was difficult on account of the scarcity of materials and the heavy 60% tax on them. Happily, in spite of these handicaps, our friends in Britain have been able to assemble a show, and we shall soon see the Second Royal Show to reach us since these Exchanges have been in operation. Almost every print in the list of exhibitors is made by an Associate or a Fellow of the Royal. This means that we shall see the best of contemporary English photography. Tell your club program chairman about this show and make your reservation for it.

Keast Burke, PSA Representative for Australia, has been busy for months preparing an exhibit, "Meet the Australians," which soon after its arrival will probably be seen at the George Eastman House in Rochester, and at the Commonwealth of Australia News and Information Bureau in New York City. Following these exhibits the show will be available for your club, if you make reservations for it. This show will depict life in Australia, and while made by top-flight pictorialists, will accent Australian scenes, work and life in that far away land.

John O. Hay, of Cleveland, has volunteered to assemble a show from the Northern Ohio Area. This is welcome news indeed. Aside from a fine show from the Akron, Ohio, Clubs some time ago, the many fine photographers from the Cleveland area have not been represented as much as we would have liked.

A new exhibit has just arrived from Holland, all nicely packed in a snug wooden case, as clever as a wooden shoe. J. Akkerman, of Rotterdam, is responsible, and those clubs who were fortunate enough to have seen the First Dutch Show will hurry their reservations for the second.

A second "One-man Show" has been received from Francis Wu in Hong Kong. Mr. Wu, who is a Fellow of both the PSA and the Royal, is acknowledged to be tops in China. He deserves great credit for the trouble and expense to which he has gone to make his fine pictorial studies available to us here in America. We now have three Chinese Shows for loan to camera clubs. Write for one.

New American shows are badly needed. If you live in a community where camera clubs have an association, that's the very place for some one to volunteer and assemble an exhibit. Write me for details.

DR. WILLIAM F. SMALL, *Associate Editor*

Australasian Portfolios

Circles No. 1 and No. 2 are now traveling in the United States and our prints of the same circles are in New Zealand and Australia. Because of the long delay in the circuit, Harold Larsen, General Sec'y in New Zealand, shipped both of these cases to the States by "Air Express" to the tune of nearly $40.00.

Circle No. 3 arrived in the States a few weeks ago by Air Cargo and is being delivered to the Secretary, Dorothy Kilmer.

Quoting from the Note Book

H. E. Gaze writes:

I have often been asked if I regard photography as an art. I say without hesitation, "Yes!" So long as those who practice it have the inherent temperament, judgment and training to produce an artistic portrait or picture in either figure study or landscape, they have as much claim to call themselves artists as those who work with palette, brushes and canvas. But I will add that it is much more difficult to produce a picture (I don't mean photo) by photography than it is with brushes and paint. This, after my former statement, may sound parodoxical, but it is quite true. It is true, because a painter, if he is well trained

and skillful, can modify an error of judgment in color and correct a mistake in drawing on his otherwise completed picture. In photography, this is usually impossible as repairs to a fault on either print or negative are too much in evidence. An enthusiastic worker may visit the same locality several times with the intention of securing a picture but will ultimately give up in disgust, because the conditions which existed on his first visit and by which he was so impressed, will not occur again.

Edith Royky writes,

You read about a lot of people's pet methods of waxing, print lustering, varnishing, etc., etc., and it all sounds mussy and gooey. I have tried Johnson's Car Plate on both glossy and dull surface prints and it makes a beautiful, smooth, hard finish.

Don Haasch, Secretary of the Indian-American Portfolios, sends this news of his portfolios: The No. 2 Circle is now travelling in the United States. We welcome two new members: Edward C. Dorsey, 17 Jefferson Place, White Plains, N. Y.; Morris Gurrie, 5412 N. Bernard Street, Chicago 25, Ill.

Mrs. Hilleve L. Clifford has been appointed the Circle Secretary of the 2nd Indian-American International Portfolio.

The Indian members of the No. 2 prefer bromide paper and suggest that the American-made pictures would be improved if the American members switched to bromide instead of using the slower chloro-bromide.

Netherlands-American Portfolios

Prints in the Netherland-American Portfolio's 3rd Circle were received from the American members in September. It was held for the PSA convention at Baltimore where it was exhibited for the duration of the convention. It was decided to do this as the prints in the 3rd circle now travelling in Holland had not yet been received. They were sent there last April.

Translation of the English comments into the Dutch language is being done at present and this portfolio will then be shipped to Holland. As soon as the other portfolio is returned, the Dutch comments will be translated into English and a new schedule will be made up for the American members. More time will be allowed the members than heretofore when the schedule is made up, so as to keep the portfolio better on schedule.

Prints in the 3rd Circle just received are all of a varied and interesting nature. This shows us that our photographic minds are the same on both sides of the Atlantic.

The Holland workers do not care very much for rough textured surfaces, even when a large print that does not depend on detail for its success is printed on such paper. Also, they do not care for cream colored stock in general. However, we American workers should never fail to bring home the fact that cream stock and texture papers will add to certain prints.

John Moddejonge, APSA, secretary of these Portfolios, spent a month and a half in the Netherlands this past summer, and had the pleasure of meeting the Dutch members, Akkerman and Algra. While in Holland he met with many photographic workers and lectured at four camera clubs. Holland is a unique and colorful country and one can get interesting shots at every turn of the road and street. A paradise for the observing photographic eye.

Noteworthy was the fact that of the ten members of the Netherlands-American portfolio, six were present at the recent Baltimore Convention: Firth, Hogan, Miess, Moddejonge, Small and Weber. Also, the director of International Portfolios, Miss Jane Shaffer, was in attendance.

PSA International Portfolios

There are openings in the following PSA International Portfolios for Pictorial Division members who are interested in interchanging prints for comment and analysis with the leading photographers in foreign countries:

Anglo-American
Canadian-American
India-American
Australasian-American
Cuban-American
French-American
Swedish-American
South African-American
Brazilian-American
Belgian-American
Chinese-American
Netherlands-American
Dominican-American
International Medical Portfolios
Costa Rican-American
Caribbean-American
Mexican-American
International Control Process Portfolios

For information, write to the Director of PSA International Portfolios, Miss Jane J. Shaffer, 5466 Clemens, St. Louis, Missouri.

Country Boy Makes Good

This is the caption of an article giving the photographic story of Jack Carney of Australia, and it makes interesting reading.

For years John Patrick Carney has been getting letters, packages and parcels with strange and sometimes beautiful stamps on them from Argentina and Austria, Sweden and Spain, Luxemburg and Czechoslovakia, Eire and Holland, China and Brazil—half of the countries of the civilized world. And for years the Post Office has been collecting a small fortune in Australian stamps on the letters and packages he sends abroad, for he has secured over 5000 awards in Australian photographic exhibitions, has shown more pictures abroad than any other Australian.

One of his pictures, he declares, sent a man to heaven. The story is that a study of two Sydney silky terriers in the magazine was shown to a woman whose sick husband was a dog fancier. She showed him the picture, he read further in the magazine, realized that he had slipped a little in his religious observances, and asked for a priest. He died soon after, reconciled to the Church. But Jack Carney is happy that his work should have contributed so directly toward the saving of a soul, and the picture is among his favorites.

Carney is best known for his charmingly sympathetic portraits of small children, but he refuses to specialize in any particular field. His exhibition pictures range from bunches of grapes to landscapes and seascapes, from individual trees to character studies with a touch of Rembrandt in their lighting, from bright-eyed cats and dogs to figurines, flowers and architectural detail. But no nudes.

Ask him, "Why no nudes?" and he will reply with a grin, "My wife won't let me." But there is more to it than that. He admits that nudes are popular in overseas exhibitions, and would probably increase his number of acceptances, but in a small town like Griffith, where everybody knows everybody else, the anonymity of models could not be preserved even if models could be obtained, so he has not troubled to add this field to his studies.

His advice to the amateur is to buy the best equipment he can afford, join a camera club if there is one about, attend lectures if there are any, read any photography textbooks and publications he can lay his hands on, test and experiment and learn by mistakes until he gradually acquires the knowledge that carries him through. There isn't any short cut. The technique can be conquered by perseverance and reading, but the artistic side, the selection of subjects, the composition of a picture is more difficult. It can partly be obtained by studying the work of award winners in recognized circles, particularly the work of internationally acclaimed photographers; and gradually the feeling for a picture will grow. He mightn't become a top-ranker, but at least he can take a competent photograph.

Leo C. Massopust, Director of Art and Photography at Marquette University and Secretary of the Medical Portfolio, recently painted a picture of Father Anthony F. Beren, S.J., regent of the Marquette Medical School. The portrait was presented to Father Beren by the Alumni Association with fitting ceremonies in the Bletz Auditorium.

The Recorded Lecture Program

DR. C. F. COCHRAN, *Associate Editor*

Since the first announcement of the PSA Talks in these columns there has been a flood of inquiries. It seems that, true to our expectations, there is a big demand for the type of material which we have in these recorded lectures.

It may be well, at this time, to recapitulate briefly just what these programs are. Following the time-honored practice of showing pictures and hearing someone talk about them, the Recorded Lecture Program of the Pictorial Division has instituted these fine Talks. The talk consists of a recorded lecture with which slides are shown. Each program is an hour or a little less and is illustrated by anywhere from 30–50 slides. It is not claimed that a program of this nature is better than, or even in most cases as good as, a live speaker with real original prints. It is obviously impossible for a speaker to travel to every club and drag along a stack of prints, no matter how much time and energy they have. Yet by means of these Talks the

speaker can go anywhere and even be in several widely separated spots at the same time.

Nor is this the entire story. Almost without exception the speakers have confessed that they spent more time in preparation and gave more thought to these recordings than they have for an "ordinary" camera club lecture. The very nature of a recording makes for a completeness and a polish which simply does not exist in the usual "live" delivery. The very deliberation and care which is needful in making a recording can very easily make the difference between an adequate talk and an excellent one. It is not unusual to spend four or five hours of actual recording work to put down on a tape a one hour program, even after all preparation is complete and the speaker is ready to speak.

It was flattering to hear the many nice things which were said about the Recorded Lectures at the Baltimore convention. And progress was made at the convention. One lecture was recorded and a list of promised lectures was compiled. The deeper we get into this program the more promise it shows. The best speakers in the country freely offer their services.

It takes time, though. One talk may be the result of months of negotiation and preparation. It will be a long time before the seeds which were sown at the convention find their way into full flower in your clubroom. Our catalogue is excellent but limited. It will be broadened with each release. There will be a day when we will be able to supply a whole year of programs for a club.

I would like to take this space to thank the many officers and members of PSA for the fine spirit they have shown and for the splendid cooperation. The Revere Camera Company and Ray Moudry deserve mention for the help they have provided in the matter of technical assistance in the actual recording.

New Release

The new release for this month is a talk on "Still Life" by Ann Pilger Dewey, Hon.PSA, APSA.

Mrs. Dewey lectures from her own prints and selections from her collection, showing the whys and hows of a good still life picture. The sound advice and the intelligent instruction on this subject makes it of value to any photographer, regardless of his interest. Those factors which make a good still life are the same as those which contribute to the success of any picture. Skills which accrue in the making of a still life carry over into almost any other branch of photography. Lighting, composition, ideas, and such, are essential to the production of a good picture no matter what its type or character.

Ann Dewey is competent and inspiring as a speaker, as those who have heard her will testify. Mrs. Dewey was at one time secretary of PSA, is a charter member of the Society, and is a prolific exhibitor. She speaks with authority when she offers the information which she has acquired in her broad experience.

Coming Attractions

It would be nice if we could tell you of some of the fine lectures which are in store for you and your club in the future. But this cannot be. As you might assume, we would not announce a program in these columns until it was completely prepared and ready for circulation.

You must be content with the assurance that new lectures are being prepared and contacts to arrange others are being made. Our list of prospects and lectures in preparation is an impressive one. Some of the names on the list are practically legends, names we have heard ever since we first became interested in photography. Yet these people will come to your club and speak, not in person it is true, but their voice and personality and their pictures and the pictures they choose will certainly be there.

At the beginning of this program several of the talks were circulated among a few clubs on a preview basis. It was felt that a certain amount of field testing was desirable. The proof of its desirability was soon apparent. Comments, full and detailed, came back to us. There was enthusiasm for the project. There was enthusiasm for each of the talks but there were also some criticism of certain details. A great deal was learned from these few tests which will improve future releases.

LYNNE PASCHALL, *Associate Editor*

I have just returned from the Baltimore Convention, and if some of the news from that important event creeps into the column this month, I just can't help it. Maybe you attended also, hundreds of PSA members did. It was part of my vacation, and my wife accompanied me. She is not a camera addict, but she attended the sessions faithfully and enjoyed them as much as I did.

You have heard a lot about the Convention by this time, no doubt, so we shall refer only to the features that concern Camera Club Activities.

Saturday afternoon, a meeting was held under the general guidance of H. J. Johnson, FPSA, Vice President of the Society. A number of club bulletins were shown and discussed, and all agreed that the bulletin plays an important part in the success of any camera club. However, the publication must be suited to the needs and limitations of the group to which it is addressed. It would be futile to consider half-tone pictures and letterpress printing for camera clubs of a dozen members, and there are many clubs no larger.

Another matter that came up for discussion was the interchange of print exhibits between clubs. The writer was surprised when a young lady asked how to find a club that had prints to exchange. This column has been shouting for months about the advantages of the Camera Club Print Circuits, and we were beginning to fear that the constant repetition was becoming tiresome. But, of course, it is unreasonable to expect everybody to read every word of the magazine every month.

Mr. William Hutchinson, the director of Camera Club Print Circuits, was unable to attend the Convention, so we had to tell his story for him. When I reached home, I found a letter from Mr. Hutchinson, and quote the following from it:

Participation in CAMERA CLUB PRINT CIRCUITS is one way to overcome your program problem. It provides an outside viewpoint, also gives the club members an opportunity to see the average level of the work of other clubs and a chance to express their own point of view.

In a letter just received from Harold J. Grow, Program Chairman of the Orange Camera Club, East Orange, New Jersey, he said "The single PSA Camera Club Print Circuit that the Orange Camera Club participated in last year was certainly a great success. The fine way it was set up contributed much to our enjoyment of the program built around the prints when they reached us."

Clubs participating in Camera Club Print Circuits should make it the program for the night. Devote sufficient time to study each print, ask the members for their comments, and write all the constructive criticism on the comment sheets provided. In this way, the print makers and the club members viewing the set will find Camera Club Print Circuits have contributed a most interesting program.

Mr. and Mrs. Fred Fix, of Chicago, were at the Convention. Mr. Fix is the director of the American Exhibits—the print shows by celebrated photographers that may be borrowed by PSA camera clubs for a nominal charge. Mr. Fix reports that the demand has been great and some of the shows have been booked far ahead.

All parties interested in program material are advised to write to the director of the particular activity concerned. The names and addresses of the directors appear in "The Folio" mast head.

MISS CHARLOTTE KESSLER, *Associate Editor*

A Question For You

Are you missing something? Have you tried the Personalized Print Analysis Service? This is an opportunity for you to have your work analyzed with appropriate comments to help you make better pictures.

Here is what G.N.G., of East Orange, N. J. wrote: "As to the real service you are rendering, I sincerely believe that this is just the service the majority of PSA members have been seeking all these years without really knowing it and that many

will take advantage of it (in more ways than one). It is, indeed, a service that cannot be measured by the golden yardstick of the almighty dollar and, as such, should be welcomed by the entire PSA membership."

You can have this service without charge by simply following a few simple rules. Prints should be 5 x 7 to 8 x 10, sent first class with return mailing label and first class postage included. On the back of each print should be the name and address of the maker, title of the picture, technical data and pertinent details. Also include a brief statement of the idea or purpose behind the pictures, and the purpose for which it was taken (club contests, salons, etc.). To help the analyst do as good a job as possible, a contact print of the entire negative should be attached to the back of the print.

Prints should be sent to J. E. Armstrong, APSA, Director, 17402 Monica, Detroit 21, Michigan. A comprehensive analysis and appropriate comments will be returned with each print.

Coming Salons Agreeing to Follow PSA Recommendations

NOTE: M—monochrome prints, C—color prints, T—color transparencies, SS—stereo slides, L—monochrome slides, A—architectural prints, S—scientific or nature prints. Entry fee is $1.00 in each class unless otherwise specified. Recognition: The monochrome portions of salons listed have Pictorial Division approval. Check salon list of appropriate division for recognition of other sections.

Detroit (M,T) Exhibited Jan. 14 to Feb. 4 at Detroit Institute of Arts.

Wilmington (M) Exhibited Feb. 4–25 at Delaware Art Center.

Minneapolis (M,C) Exhibited Feb. 4–24 at Minneapolis Public Library.

Winnipeg (M,C) Closes Jan. 20. Exhibited Eastman Stores Feb. 17–Mar. 3. One entry fee for one or both classes. Data: H. E. Nicholas, 118 Lawndale Ave., Norwood, Manitoba, Canada.

Circle of Confusion (M,T) Closes Jan. 31. Exhibited Feb. 11–25 at Art Gallery. Data: John S. Goodwin, 2028 Howard St., Whittier, Calif.

Rochester (M,T,S, Documentary) Closes Feb. 9. Exhibited Mar. 2–Apr. 1 at Memorial Art Gallery. Data: Ezra C. Poling, Memorial Art Gallery, Rochester 7, N. Y.

Great Falls (M) Closes Feb. 10. Exhibited Mar. 1–12 at Service Men's Center. Data: Miss Elwis Cahalan, Box 1097, Great Falls, Montana.

Philadelphia (M,T) Closes Feb. 10. Exhibited Mar. 3–25 at Free Library. Data: John A. Adams, 546 Putnam Road, Marion Station, Penna.

Montreal (M) Closes Feb. 13. Exhibited Mar. 9–28 at Museum of Fine Arts. Data: Walter F. Wood, 500 Dominion Square Bldg., Montreal, P. Q., Canada.

Pittsburgh (M,T) M closes Feb. 21; T, Feb. 28. Exhibited Mar. 16–Apr. 15 at Carnegie Art Galleries. Data: Karl S. Leach, 92 Estella Ave., Pittsburgh 11, Pa.

Port Colborne (M) Closes Mar. 3. Exhibited Mar. 18–31 at the club. Data: Dr. G. B. White, 54 Clarence St., Port Colborne, Ont., Canada.

Worcestershire (M,T) Closes Feb. 21. Exhibited Mar. 17–Apr. 7 at City Art Gallery. Data: H. Taylor, Sunningdale, St. Andrew's Road, Malvern, Worcestershire, England.

Reading (M,T) Closes Mar. 12. Exhibited Mar. 25–Apr. 22 at Public Museum and Art Gallery. Data: August J. Heidrich, Central YMCA, Reading, Pa.

Seattle (M) Closes Mar. 15. Exhibited Apr. 4–May 6 at Art Museum. Data: Ray B. Pollard, 4063 56 Ave. S. W., Seattle 6, Wash.

Newport News (M) Closes Mar. 31. Exhibited during April at Mariners Museum, Data: T. P. Holt, 1016 Ferguson Ave., Newport News, Va.

Louisville (M,T) Closes Mar. 31. Exhibited Apr. 28–May 20 at J. B. Speed Art Museum, Data: Ernest T. Humphrey, 4722 Buckley Ave., Louisville 8, Ky.

RECORDINGS AVAILABLE

The Recorded Lecture Program of the Pictorial Division offers the following PSA Talks to your club:

No. 1. An analysis of Recognized Salon Prints by Ragnar Hedenvall, APSA

No. 2. Commentary on Recognized Salon Prints by Morris Gurrie

No. 3. Outdoor Photography by D. Ward Pease, FPSA

No. 4. Still Life by Ann Pilger Dewey, Hon.PSA, APSA

Available from Dr. C. F. Cochran, 3946 N. Lawndale Avenue, Chicago 18, Illinois.

SPECIAL. Photography of the Nude by P. H. Oelman, FPSA. (Available only from Mr. Oelman at 311 Main St., Cincinnati 2, Ohio.)

Toronto (M) Closes Apr. 10. Exhibited Apr. 30–May 12 at Camera Club. Data: Rex Frost, Toronto CC, 2 Gould St., Toronto, Ont., Canada.

Other Overseas Salons

Lucknow (M,C,T) Exhibited at Lucknow, Allahabad and New Delhi Feb.–March 1951. Data: Secy., U. P. Amateur Photographic Assn., 10 Cantonment Rd., Lucknow, India.

Birmingham (M,L,T) Exhibited Feb. 10–24 at Royal Society of Artists Galleries. Data: E. H. Hudson, 129 City Road, Birmingham 16, England.

London and Cripplegate (M,T,L) Closes Jan. 29. Exhibited Mar. 12–17 at the Cripplegate Institute. Data: City of London & Cripplegate Photographic Society, 145 Thanet House, Thanet St., London, WC 1, England.

Charleroi (M) Closes Feb. 10. Exhibited Apr. 1–15 at la Salle de la Bourse. Data: M. R. Populaire, 18 rue J. Destree, Charleroi, Belgium.

Ipswich (M,S,C,T) Closes Feb. 24. Exhibited Mar. 26–Apr. 7 at Art Gallery. Data: W. T. Nash, 44 Corder Road, Ipswich, Suffolk, England.

Johannesburg (M) Closes Mar. 15. Exhibited during May at Port Elizabeth, Durban and Pietermaritz. Data: Peter Marples, P. O. Box 7024, Johannesburg, So. Africa.

Cologne (M) Exhibited Apr. 20–29 in Exhibition Halls of Cologne. Data: Photokina 1951, Messe- und Ausstellungs-Geo. m. b. H. Koln, Cologne-Deutz, Germany.

psa Camera Club

H. J. JOHNSON, FPSA
2134 Concord Pl., Chicago 47, Ill.

Tips for Clubs

The Baton Rouge CC "Lights and Shadows" notifies its members that two constitutional changes are proposed. One of these is to have business handled apart from club meetings. The other is to change the club year to the calendar year. Our usual advice when asked about term of office is that it is more convenient to have it coincide with the photographic season, which is Sept.–June. Thus officers are responsible for a chronological unit and have the summer lull to plan in advance of their active office. However, when a club is fully active during July and August, the "season term" has less significance.

Berks' "Safelight" reports some of the highlights of the PSA Baltimore convention, attended by several members. Such personal reports are usually of high reader interest to fellow club members.

Bozeman CC's "Flash" gets in several plugs for PSA. We have noticed that a number of bulletins follow this policy and we believe it is a good one. For one thing, if you get enough new members, it means your club's PSA dues paid up for a year!

One way a club can help others (and ultimately help itself) is to let other clubs know about speakers which it has found to be especially well qualified. For example, the Brooklyn Color Slide Club, pleased with Olga Irish as a lecturer on portraiture, made it a specific point to recommend her to other organizations.

"Camera Notes," official bulletin of the Camera Club (N. Y.), reproduces the cover page of "Camera Notes" for 1900. Very few clubs go back that far (The Camera Club is one of the oldest in the country) but even so, how many have a complete file of their club bulletins? Because of historical, reference and other values, a requirement of each editor should be that he turn over to his successor a complete file of the club bulletin.

From the Cameraderie (San Jose) "Panorama": "Outside judges can consider each print on its own merits, and they can give us a lot of their own ideas and pull a picture apart if need be. Just keeping to ourselves is inclined to get us in a rut, and I think we need the outside stimulation of someone else's ideas once in a while." This is the healtiest policy for a club and is the one we recommend strongly. It is surprising how "set" a club can become if it has only a minimum of outside stimulation.

The Circle of Confusion CC (army personnel in Japan) reports a new type of slide competition. Contestants bring in their unopened film received back from processing. Judges open the boxes, remove slides Nos. 5, 10 and 15 and judge these. They don't report what is done about 8 exposure bantam film, but probably Nos. 2, 4, and 6 could be used.

The Detroit Guild "Bulletin," good enough to be one of the winners in the club bulletin competition, is now even better after almost a metamorphosis. A cover sheet has been designed, solid pages of text broken into columns, etc. The point is that some of the changes are based on suggestions given on the score sheets from the PSA competition. If your club publishes a bulletin, be sure it is entered in the next competition so that it may benefit by specific suggestions from experts on club bulletins.

El Camino Real CC (Los Angeles) will change exhibition dates of its annual international exhibition from May to June in order to fit in with the PSA regional convention to be held in Santa Barbara at that time. This show is one of those which have received Color Division special recognition for efficiency and service.

Germantown Photographic Society's "Crier" is interesting to us for something quite apart from its text and makeup. It is the diversity of its ads. Not only are camera shops represented, but also florist

shops, realtors, restaurants, paint stores, etc. Clubs which solicit advertising for their bulletins might consider the possibility of expanding their field to non-photographic sources of revenue. (But tread carefully!)

Green Briar CC, as we learn thru its "Honorable Mention," has bought a tape recorder. Not all clubs can afford such an investment, but those which can will find that it will more than justify itself in many ways: preserving the lectures of photographic authorities; preparing instruction material in connection with banquet programs; etc. Even clubs without large treasuries can finance a recorder by renting it out to members and other clubs.

The Merced CC has the common problem of much talk about pictures but no pictures! Their problem was to get everyone too interested in a project to be self-conscious about amateur efforts. The solution was a community project to take pictures of polio patients and polio treatments, in cooperation with the local chapter of the National Infantile Paralysis Association. Result: when prints were due, 100 were turned in. These projects do not always work this successfully, but if your club occasionally can find something equivalent, it will stimulate print making.

The Motor City CC has been considering the question of dues for spouses of members. Preliminary decision is free dues. This problem is one which has to be considered by most clubs these days since so few are now exclusively one sex. What makes it a problem is that the husband or wife may actually not be a photographer, in which case the dues might be waived. But the usual solution is a special rate for the couple, equivalent to about one and a half times regular dues.

The Washington National Photographic Society's "Finder" reports the enthusiastic reception of Pop Whitesell's lecture on group photography. The point is that Whitesell's lecture was part of a tour organized by the PSA National Lecture Program, and any club which can manage an audience is missing good program material if it does not investigate the possibility of fitting into a tour schedule. Write to Jack Clemmer, West Richfield, Ohio.

The New York Color Slide Club allows club competition credit for acceptances in certain selected color shows, basing the selections chiefly upon which shows have received "special recognition" by PSA Color Division. This is a commendable method for selection because it means that members will be assured of efficient handling of their entries. Also it gives extra support to those shows which have demonstrated more than average consideration for their contributors.

North Shore CC (Mass.) is sponsoring a Junior Achievement camera club, furnishing attendants, instructors, and advisors. Projects such as this involving young people's camera clubs in high schools, churches, etc., afford opportunity for camera clubs to serve community interests and at the same time serve themselves, since members of these junior clubs will graduate into regular clubs if their interests are maintained.

Oakland CC, in its "Panoram," reports dissatisfaction with the term "beginner" in its competition classifications of "beginner," "advanced," and "salon." Previously, the word "amateur" had been used. Best solution to all the problems of what to call the various grades is to use the simple, straight-forward system of calling the classes "A," "B," and "C."

Among awards recently presented by Pictorial Photographers of America (N. Y.) were awards for outstanding service to the club. If competition awards make better photographers, won't service awards make members more willing to do efficiently some of the real work of the club?

The Rockefeller Center CC and the Penn RR YMCA CC meeting together for a program by Mr. and Mrs. R. North ("Photography as we like it") reminds us that while joint meetings are nothing new, they have yet to be tried by many clubs. Such meetings enable the obtaining of a more expensive speaker than available to one club alone, etc. The important point in the procedure is not to organize something and then propose that the other club join you, but to approach the other club beforehand with the suggestion that a committee from both clubs get together to plan the project.

The Racine CC "News" is looking for a more distinctive title. While in general, a specific name is not required for a club bulletin because it usually cannot be much more than just that, a definite name is desired by many. Most popular are names of camera parts and accessories. There are several "Rangefinders," etc., and it might be well to consider broadening the field enough to have fewer duplications. "Baseboard," "Landscape," "Rewind," are examples of expansion of the field.

Editor A. F. Glas of the Seven Hills CC gives a breakdown of the total time necessary to publish the club bulletin. A total of 20 hours per issue is required including cutting of stencils, machine time, editing, etc. This is equivalent to 2½ full time work days and gives an idea of the amount of work which is taken so much for granted by other members. Even when the duplicating is done commercially, the editor still is obligated for more time than most other officers. Thus it is apparent why help in the way of contributed items from members is so much appreciated by editors.

Silver Bow CC "Synchronizer" reports their interest in the "Chicago Pictorial" slide set because of their own project to pictorialize Butte. Clubs working on similar projects can refer to the article in the October issue of PSA JOURNAL for suggestions as to organization of the mechanics for such a project.

Springfield Photographic Society's "Exposures" refers to an inventory of club property. Inventories are important in the functioning of a club because it is puzzling the way equipment seems gradually to melt away unless there is a responsible accounting for it. Best way to handle inventories is to have incoming and outgoing custodians make the check together, with the outgoing custodian receiving a receipted copy of the inventory and in turn furnishing an accounting for any items missing from the previous inventory.

The Toronto YMCA CC had a problem as to what to do about models for studio nights: hire, or use members? They finally decided to use members. This was a wise choice for two reasons (other than financial savings): first, the instruction value of light manipulation is just as complete as with a professional model; second, the portraits obtained can be an interesting part of the club album. Actually, professional models are justified in a club only when the intention is to obtain pictures which can be sent to the shows. (Even here, there is an ethical question as to whether "model night" pictures are genuinely the work of the photographers.)

Tulsa's "Groundglass" reports that entries in the Tulsa International increased from 1083 last year to 1458 slides this year. Tulsa was one of the few shows receiving "special recognition" by PSA Color Division, and the increase reflects a growing intention on the part of slide makers to send to the better shows and skip those which think of color contributors only as a source of revenue.

Waco CC is discussing the possibility of buying a hot plate for coffee making. It's not a bad idea. Clubs which have their own quarters should have a heating unit of this type not only for use in connection with mixing chemicals, but also for coffee making. Then members working in the darkroom between meetings can have an occasional "coffee break." After regular meetings, coffee can be ready for a sociable "bull session."

The New Westminster CC (Canada) is trying to persuade its members to participate more in the discussion during print criticism sessions. One way to encourage broader participation is to have a group leader whose job is to encourage expression of opinions by members who are diffident. The machinery for such a job is outlined in the June 1949 issue of the JOURNAL, page 369.

Other clubs very likely are having to meet the same problem that Westmoreland (Pa.) has. The secretary is being called by the army and an election for replacement will be required. The "angle" here is that Westmoreland quotes the section of the constitution which says only paid up members may vote. It's a good idea in all elections to limit the voters to paid up members because it helps emphasize the necessity to keep dues paid up.

World's Largest Color Show

With 865 entrants and more than 3500 slides, the recent Chicago International Color Slide Exhibition demonstrated that the color field is still expanding.

The statistics should prove interesting to clubs which sponsor internationals (black-and-white, color, or a combination) because they indicate that many shows are scratching only the surface of potentialities in exhibitor support.

Another interesting fact is that the chairman, Russel Kriete, handled the show in his "spare time," since he also is president of the Chicago Color Camera Club.

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GEORGE F. JOHNSON, APSA
Forestry Bldg., State College, Penna.

The greatest expansion in color photography in history is likely to come in the next decade, provided world conditions do not get too bad. The Color Division must continue to serve adequately the present needs and to anticipate correctly the future requirements of those seriously concerned with color as this new decade unfolds. The combined efforts of all of us will be required in thinking and working out the new problems that arise. I feel sure an organization with so many enthusiastic color workers throughout the world as PSA can meet this challenge admirably, and I am grateful to have this opportunity as Color Chairman to work with you during these eventful days in color history.

New Record Set

Under the able supervision of Merle S. Ewell, of Los Angeles, California, the National Club Slide Competition for 1950–51 is well under way with a record enrollment of 105 clubs. Thirty-one states, Hawaii, Canal Zone and Canada are represented. Thirty-five clubs are enrolled which have never entered before. There are 44 clubs in Class A, and 61 in Class B. The judging of the slides has been separated for the two Classes due to the large number of clubs taking part. The Sierra Camera Club of Sacramento, California, conducted the October judging for Class A entries, while the Long Beach Camera Guild of Long Beach, California handled the Class B contest. The growth of this Color Division activity is evidence of the rapidly increasing interest in color photography in camera clubs throughout the PSA membership. The clubs enrolled in the competition in 1948–49 totalled 60; in 1949–50 the number increased to 78, and then reached the record of 105 for the present series of five bi-monthly contests which started last October, continuing in December, February, April, and June. Plaques, medals and ribbons are awarded to the highest scoring individuals and clubs.

"Who's Who" 1943–1950

For the last seven years, the September issue of PSA JOURNAL has carried "Who's Who in Color Slide Photography." This is the official and now the only compilation of acceptances in international color slide exhibitions of recognized merit.

The first "Who's Who" for 1943–44 covered three exhibitions. The next year seven exhibits were recognized and the total has grown until in 1949–50 it included 29 shows. During the seven-year period 103 exhibitions met requirements for inclusion in the list. A check of the exhibitors shows that no one person had acceptances in all 103 shows. The closest to a perfect score was Karl A. Baumgaertel, APSA, of San Francisco. He had entries in 98 shows and served as judge in three others, which means that he had complete rejections in only two exhibitions. The runner-up was Mrs. Frin Vanden, of Chicago, with acceptances in 98 shows, two shows judged, one show not entered and complete rejections in only two exhibitions. The tabulation for the seven-year period shows the leading five color slide exhibitors as follows:

Name	*Shows*	*Slides*
Karl A. Baumgaertel	98	279
Frin Vanden	98	270
Herman Bielenberg	91	264
C. B. McKee	90	260
Blanche Kolarik	94	255

Better Shipping Box

Can the wooden, side-open box now in general use for shipping color slides to exhibitions be improved to insure even greater safety to the contents? After receiving his entry from a recent exhibition with the wooden box and all four slides badly broken, Edward A. Hill, APSA, of Fleetwood, Pennsylvania, comes through with suggestions for a better box.

Have the box open at the ends, Mr. Hill says, rather than at the sides and build top and bottom of hard pressed board rather than wood. This will make the box stronger and improve the size from the 2¼" x 5" to a 3" x 4¼" size, making addressing and stamping more convenient. Mr. Hill also suggests about one-eighth inch clearance above the slide box inside the shipping container as a place for the entry form, since folding and placing it with the slides in the yellow box is often difficult.

In The West

A rural-minded Easterner traveling in the Rocky Mountain area last July was attracted by the cattle and sheep on ranges bordering the highways. In attempting to get color-slide views of these subjects, he soon found that the approach had to be quite different from that in eastern meadows. Several good picture possibilities were ruined by rushing out of the car, running to the fence or a roadside elevation and then trying to get the attention of the animals by clapping hands or barking like a dog. Western livestock is apparently not accustomed to such informality. By the time you have a meter reading and are ready to take the picture, the subjects have alerted themselves and are out of range of even a 135 mm lens. You must photograph from the car, or else move very quietly and slowly to the fence or roadside spot without even a whisper. Better still, try approaching back of a fence, tree or other object. It seems that western livestock is leary of any one not on horseback! There would be more good livestock scenics of the west if photographers traveled by horseback rather than in automobiles, our Easterner concludes.

Slides to Tokio

The use of color slides in the hospitals is increasing greatly, reports Karl A. Baumgaertel, APSA, who is in charge of our Color Division hospital slide project. We can use all the slides we can get. One of the most recent requests for slides came from Lucille B. O'Neill, head recreation worker of the American Red Cross of the Tokio General Army Hospital. "I am taking care of this request through the kindness of the many recent donors to the project," Karl writes. "We are now providing such needs in about 25 hospitals." If you have slides for this very worthy cause, package them carefully and mail to Karl A. Baumgaertel, 353 31st Avenue, San Francisco, California.

Interest in Stereo

The success of the Chicago Stereo Show and the increasing number of inquiries reaching us indicate growing attention to this new field for color-slide workers. Probably we can develop special services in the near future for those interested in this field. Activities such as circulating slide sets and testing services can be undertaken if the interest warrants. If you have suggestions, pass them along to the Color Division chairman.

Coming Color Exhibitions

Chicago Nature, Feb. 1–28, deadline Jan. 15. Color section, four slides (up to 3½x4). $1. Forms: Blanche Kolarik, 2824 S. Central Park, Chicago 23, Ill.

Minneapolis, Feb. 13–14, deadline Jan. 22. Four slides, $1. Forms: Warren Anderson, 123 S. 7th Av., Minneapolis, Minn.

Whittier, Feb. 11–25, deadline Jan. 31. Four slides, $1. Forms: John S. Goodwin, 2028 Howard St., Whittier, Calif.

Philadelphia, Mar. 3–25, deadline Feb. 10. Four slides, $1. Forms: John A. Adams, 546 Putnam Rd., Merion Sta., Pa.

Montreal, deadline Feb. 24. Four slides, $1. Forms: Walter F. Wood, 500 Dominion Square Bldg., Montreal, Quebec, Canada.

San Francisco (Photochromers). Mar. 10–17, deadline Feb. 24. Four slides, $1. Forms: Burton H. Ludensohn, 3140 Clay St., San Francisco 15, Calif.

New York, deadline Apr. 18. Four slides, $1. Forms: Dr. R. B. Pomeroy, 745 Fifth Av., New York 22, N. Y.

El Camino, deadline May 12. Four slides, $1. Forms: Merle Ewell, 1422 W. 48th St., Los Angeles, Calif.

psa

HARRY R. REICH
286 Schenck St., N. Tonawanda, N. Y.

I have often been asked, "What do nature photographers do during the winter months?" Invariably, the questioner anticipates an answer something like this: "Why we sit around and wait for spring to come," and is therefore surprised to learn that the winter months can be busy ones for the sincere worker in the field of nature photography. The routine outlined below is that of the general worker, of course, not that of the specialist.

There is work afield just about whenever the spirit moves. Snow texture and ice and frost patterns are ever available. Have you ever noticed the shrubbery at the corner of the house during the January thaws, when the warm noonday sun melts the snow on the roof only to have the drippings freeze in interesting ice formations when it hits the shrubbery? Have

you ever gone out on a nice nippy morning and found a stand of last year's teasel with a good coating of hoar-frost and an early morning sun backlighting it?

Have you ever gotten up on a bright sunny morning after a sleet storm has coated all the trees and shrubs on your favorite golf course with a covering of ice and converted it into a winter fairyland? Have you ever driven out into the country after a snow fall and searched out a stubble field where some of last year's grain may have fallen during harvesting and found a nice pattern of pheasant tracks conveniently cross lighted? Have you ever visited some nearby woodlot after a snow storm and found the footprints of native small game as it traveled to its favorite water hole or foraging grounds? If you have, you will realize there is plenty of work afield for the nature photographer.

If you are not such a hardy soul and are averse to sloshing around in the snow, you may still keep busy during these winter months. Select a nice dry day and armed with a pair of good pruning shears make a trip to the woods and cut yourself a supply of subject matter to work on indoors. Twigs of hickory, sumac, and ailanthus may be cut and brought indoors and placed in water and forced. The breaking buds of all three make good subject matter. Some flowering trees and shrubs may even be forced into bloom in this way. The commoner trees are Dogwood, Cherry, and Apple and in the shrubs, Forsythia, and Wygelia. Then too you may find some of the wild vines and creepers still bearing last year's crop of fruits and berries. All of these when properly lighted make fine material for nature prints.

If you have a penchant for insect photography, you can busy yourself preparing specimen cages to house your material and in which you can study it. Specimens may be gathered outdoors in the spring, but there are biological houses where one may purchase material for this purpose. In this area (western New York State) we have the Ward Co. in Rochester. They carry the cocoons of the various silk moths as well as many insects, such as the spiders, silk worms, etc. These materials are available at almost any time, or, if seasonal, the biological house will so advise and will fill orders at that time. Other houses specialize in reptiles and small animals.

This is the time of year to plan your early spring field trips and to take stock of your equipment. It is important that you have a definite plan of operation if you intend to do general nature work, as things begin to happen very early in the spring. Probably the earliest plant life to interest the nature photographer in the middle west and east is the lowly skunk cabbage. In marshy spots in the woodlot this harbinger of spring will be found pushing its head through the snow. It must be photographed early as its interest value lies in the bloom which precedes the foliage, and unless you are on the job the rank foliage will hide the bloom.

Then follows a succession of early wild flowers which are really God's gift to the nature photographer because they burst into bloom before the foliage on the trees has a chance to blot out the sunlight from the woodlot. Chief of these are the Spring Beauty, Violet, and Trailing Arbutus. The later spring flowers always offer more or less of a problem because one must wait until a spot of sunlight through the foliage picks them out in order that they might be photographed.

Another interesting period for the nature enthusiast occurs as soon as the frost has left the ground. This is the mating season of the frogs and toads. Many interesting and successful prints have been produced with this subject as its theme. Any established pond or low spot in the meadow where spring thaws create a pool is a likely spot for a gathering of the clan. One must have his ears open for the first peeping sounds from the chosen pond because these fellows don't loiter. They get into the pond, deposit their egg masses and then get out. The entire season isn't more than a three-week period and in that time all of the various species have visited the pond and gone. First to arrive are the wood frogs, then follow the leopard frog, pickerel frog, green frog, and bull frog in order, then the toads, and when they have gone not a peep will be heard until the next spring.

I have heard many lament from the novice. It goes something like this. How do you obtain your shots of the frogs? As soon as I get near the pond they all disappear. Well it's rather simple. The frogs are there for a purpose and nothing can prevent them from accomplishing their mission. So when you set out to photograph the frogs, put on a pair of waders, attach your camera to an old wooden tripod, walk boldly out to a chosen spot, preferably one where some grass lies just below the surface of the pond, and set up your tripod, pushing the feet firmly into the soft ground at the bottom and wait. The frogs will come up, take one look about and then probably disappear again. They will come up soon and take another look and find you and your camera still present and may or may not disappear again. They will, however, finally accept you as part of the scenery and go about the business at hand. Then you go about your business and if you are diligent you will have plenty of negatives to show for it.

There is always the question of the best equipment for this kind of work. Almost any equipment is satisfactory if you have some bellows extension to work with. A twin-lens reflex with suitable supplemental lenses will do. A single lens reflex of the Graflex type is satisfactory. Particularly adaptable is the Recomar type camera with double extension bellows. This is my pet equipment for nature work. I have a 9x12 cm Nagle, with an f/4.5 Nagle Anastigmat lens of 135mm focal length, and double extension bellows. With this I use 3¼x4¼ cut film. I also have two adapter backs for 35mm and Bantam color film. With this equipment I find that I can handle most outdoor work quite satisfactorily.

About this time the fellow who wanted to know what the nature photographer did in the winter is quite satisfied with the answer and some times has even been bitten by the bug.

Print Competition

This year as in the past, there will be two nature print competitions conducted by the Nature Division. They will take place in January and in May of 1951, the closing dates being the 15th of each month.

The number of entries is limited to four prints per person.

The prints must be black and white or toned in a single color—not smaller than 5x7 or larger than 16x20—either mounted or unmounted.

All prints must be titled and bear the makers name and address on the back. Return postage and mailing label must be included.

The subject matter is restricted to Nature—indoors or outdoors in any of its varied interpretations. Pictures of stuffed animals and Museum habitat groups should not be submitted.

There is no entry fee for members of the PSA Nature Division. For all others the cost is fifty cents for each contest.

Prizes will be three silver medal awards and eight honorable mention ribbons. The medal award pictures and the winners list will appear in the Nature Division column.

Criticism of each print will be given if requested.

Mail prints to Ruth Tremor, 101 Baxter St., Buffalo 7, N. Y.

Honors Committee

Last year the Society adopted a policy whereby the various Divisions would appoint a committee to make recommendations to the Honors Committee of the Society. The Nature Division has appointed the following to serve in that capacity:

Louise Broman Janson, APSA, *Chairman*
H. Lou Gibson, APSA
Ruth Sage

Any member of the Nature Division who wishes to recommend any member for honors, should obtain forms from Headquarters, prepare this form and submit it to the honors committee of the Division, where it will be screened for merit and forwarded to the Honors Committee of the society with its recommendations.

Nature Division Committee

The Executive Committee of the Nature Division for the coming year will be composed of:

Harry R. Reich, *Chairman*
Willard H. Farr, *Vice-Chairman*
Ruth F. Sage, *Sec.*
Louise Broman Janson, APSA
Louis Quitt
H. Lou Gibson, APSA
Dr. Raymonde A. Albray
Lawrence D. Hiett
Lee Jenkins
Dr. G. B. White
Ruth E. Tremor
Dr. Stanley Seeman

Coming Nature Exhibitions

Rochester. Closes Feb. 9. Exhibited Mar. 2–Apr. 1. Data: E. C. Poling. Memorial Art Gallery, Rochester 7, N. Y.

2nd Rote Color Slide. Closes April 2nd. Exhibited April. Form from Blair M. Sloppy, Berks Camera Club, 550 N. 11th St., Reading, Pa.

Much more than an enlarger

There's practically no limit to the darkroom usefulness of the Kodak Flurolite Enlarger. In addition to superb enlarging, with the appropriate accessories it can be used for copying, close-ups, photomicrography, microfilming, cine-titling, and slide-making . . . or as a view camera.

For color especially, it is outstanding. The integrating-sphere lamphouse is light-tight. The cold-light circline lamp yields excellent contrast and uniform illumination, well balanced for color work with the normal filters. Dust particles and negative defects are minimized.

Focusing is rapid; knobs for focusing and elevating are so placed that both may be used at the same time. The rigid column provides vibration-free accuracy. Chemical-resistant neoprene bellows are made for long life. Tilting negative carrier platform, with zero indicator, provides distortion control. Rotary-type Kodak Glassless Negative Carriers are available for negatives from 24 x 36mm to 2¼ x 3¼". A big, lighttight compartment in the base stores films or papers. Examine this modern enlarger at your Kodak dealer's. You'll find it's the one you've always wanted.

To give your prints their due...

When a print collects as many acceptance stickers as this, you can be sure that everything has been done just right . . . in paper selection, printing, developing, mounting, and in all the little things that contribute to its appearance.

Kodak Enlarging Papers A wide choice of papers in varying degrees of warmth and in many surfaces permits you to match the paper to the subject material.

Kodak Toners—Brown, Rapid Selenium, Sepia, and Blue—enhance the appeal of many subjects.

Kodak Print Lustre Once you have used it, you will always use it, for the brilliance and illusion of depth it gives prints on matte or rough-surfaced photographic papers . . . without altering their texture.

Kodak Print Lacquer When this solution is applied—by dipping, spraying, or by brush—your prints, black-and-white or color, are made both water- and soil-resistant.

Kodak Thermount Tissue Provides a simple, neat, permanent method of mounting any photograph. Its low melting point, below the temperature that will affect photographic color, makes it particularly desirable for mounting color pictures. Available in sheets or rolls.

Kodak Thermount Iron Thermostatically controlled to provide just the right degree of heat for use with Kodak Thermount Tissue, it rises to full heat rapidly.

Kodak Photo Spotting Pencils are available for black-and-white or sepia prints.

Kodak Spotting Colors—in black, white, or sepia—are available on separate, convenient cellulose card palettes.

Kodak Spotting Brushes—in graduated sizes—provide a wide selection for spotting prints and negatives.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak

Badinage, Brickbats and Boosts at Baltimore

A Member of the Baltimore Convention Committee, Newell Green, FPSA, and Rex Frost Report on the 1950 PSA Convention

It's just about passed into PSA history now—the 1950 Baltimore Convention. A piece or two of borrowed equipment to return with letters of sincere appreciation, a few more irksome, straggling bills for almost forgotten expenses to pay—and our local boys will dust off their hands, roll down their sleeves, slump down into easy chairs with their legs stuck 'way out in front of them and say, "Well—that's that! —But we did have a lot of fun doing it, didn't we!"

How many of the boys came in on Tuesday night, I don't know—but at 8:30 on Wednesday morning, October 18th, when the registration girls arrived, they took one look at the sea of faces and blanched under their delicate complexions. This was the spot when George Rowan proved himself to be "the man of the hour." Calm, unruffled, systematic, courteous and smilingly pleasant—he had every one of that clamoring crew signed in, paid up and ready for the afternoon's events well before lunch-time.

Our publicity boys really turned out a masterpiece of planning and arrangement in the printed convention program. There wasn't a single person that I saw at the convention who got himself bewildered and lost in a maze of program descriptions, dates and times; everyone seemed to know just where he was going, what program he was going to hear and at what time. It was that printed program more than any other one thing, that organized the whole convention and made things run as smoothly as tho' they'd been rehearsed for days.

Ward Hammond's premier showing of transparency reproductions of PSA's Permanent Print Collection got everyone into one place for a knock-out opening performance. That collection was magnificent—each print copied on Kodachrome to preserve faithfully, its rich print quality and exact toning. Elwood Armstrong's extemporaneous comments were most appropriate, constructively made and quite helpful to many in the audience.

Then came the general reception—with coffee and little, half-a-bite, frosted cakes —all very social. Right here was where Tom Firth's red-badged introduction committee took over—and what a fine job they did. Within minutes, PSAers from Des Moines and Asheville were calling veteran New York members whom they'd never seen before by their first names. Everyone met everyone else—the place became a happy, laughing, milling throng. Betty Christhilf with her group of Baltimore hostesses "poured" and supervised the serving of refreshments just as tho' they were entertaining visiting dignitaries —as indeed they were—well, luminaries, at least.

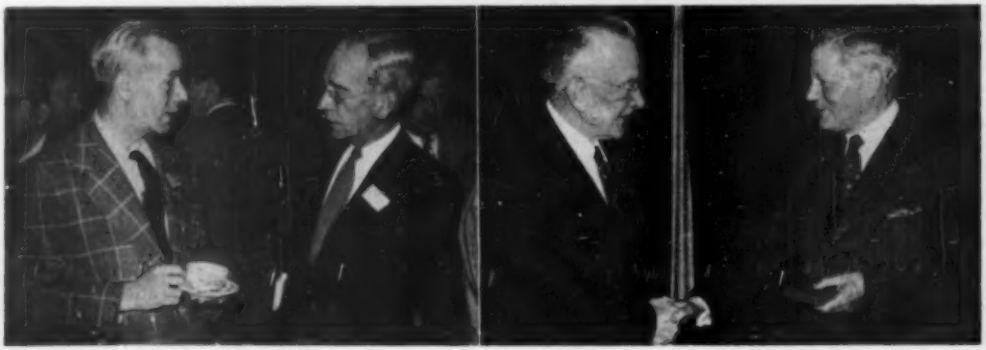
All of this seemed to put everyone in an easy, informal frame of mind which was ideal for their lively interest in the General PSA Membership Meeting and in the National Council Meeting which they all attended and seemed thoroughly to enjoy until late in the afternoon.

Thomas T. Firth, Pops Whitesell and Chester W. Wheeler. Photo by J. G. Mulder.

Wednesday night the boys had a big program planned for the Baltimore Museum of Art—presentation of the PSA Progress Award Medal, official opening of the immense PSA Exhibition and a very special program for those PSAers primarily interested in movies.

Now you certainly can't expect me to give you a blow-by-blow account of every program put on by each of the six PSA Divisions. Honest—I couldn't do some of those programs justice if I had an entire form of the JOURNAL for each. That Thursday morning kick-off program arranged by the Camera Club Committee for all PSA Divisions did more to show visiting camera club members how the PSA is functioning for them—how its facilities and experience can be used to stimulate photographic interest and club membership back home, than countless printed circulars and form letters. P. H. Oelman did a masterful job with that opening program on "The Use of Tape Recordings for Camera Club Programs." But you just can't pick one program and say, "That was the outstanding program of the convention." It was one of those rare occasions when each speaker for each division really out-did himself—one incomparable performance right on top of another for the entire three days. Too much credit can't be given to the national and local program chairmen of all PSA Divisions for having arranged and staged such an incomparable assortment of talent and topic.

How many PSAers who had come down intending to stay only a day but who



Rex Frost and Dr. David R. Craig. (Right) Dr. Loyd A. Jones receives the PSA Progress Medal from Adolf Fassbender at Baltimore Museum of Art. Photos by F. Quellmalz, Jr.

remained to "see the thing through"—banquet included—I can't tell you—but the banquet itself threatened to become a shambles because of late banquet ticket purchasers. But—disaster was avoided; Norris Harkness, in true, convivial toastmaster style, put all at ease immediately; everyone had all of the broiled Chesapeake Bay rock-fish and roast Maryland turkey he could comfortably consume and lit up one of the individually boxed cigarettes given him by the banquet committee—ready to applaud the presentation of honors with the benign satisfaction of the well-fed man.

The side-splitting feature of the banquet program was the surprise showing of a fifteen minute movie of the almost fabulous antics of the banqueters themselves taken on Thursday afternoon's harbor cruise. Squeals and screams from various sections of the banquet hall punctuated its showing as squealers or screamers themselves appeared on the screen in odd, "unconscious" poses and with ridiculous expressions. I understand, there are some PSAers who haven't yet laughed themselves out over this surprise coup staged by the Photo-Journalism Division and who are asking for first rights on the film's duplication.

Eldridge R. Christhilf, Toastmaster Norris Harkness and Douglas A. Spencer.

Well—there you are, brother; you should have placed more belief in what I tried to tell you in the JOURNAL. I guess I've given you enough of what a PSA Convention is like to make you drool with anticipation until next Fall—and Detroit. But if you miss that one—I'll just give up ever trying to make a real PSAer out of you.

Newell Green's Report

"What is it about a man with a beard that is so irresistable to the camera boys. Nothing else gets them in quite the same way."

These sentences are quoted from a report of an outing of the New England CCCs, held in Amherst, Mass., last July and appearing in the JOURNAL for October, but whether it's Amherst, Mass. or Baltimore, Md., we still say there's nothing like a beard. You know what we mean, too, if you were one of the 493 who jammed the S. S. Latrobe for that cruise down Baltimore Harbor and the Bay. The ship had hardly cast off before the gang went to work on the beard, a nice big white bushy one, which adorned the face of Charles Graf. He is an old sea captain whom the committee had on hand just in case somebody might want to take a picture. What a model he made, too, posed by the pilot house in his skipper's cap and old sweater. It was such a perfect set-up that it even had that arch anti-pictorialist, Jack Deschin, popping a few. (Careful Jack,

THE BOAT TRIP—(Top left) Isadore A. Berger, E. R. Christhilf, Mrs. Barbara Green, Miss Eva Briggs, Earl W. Brown. (Top right) Ollie Atkins, Dave Eisendrath, Fred Quellmalz. (Lower left) Berger poses Anne Urie. (Lower right) J. Joseph Courcelle and S. N. Venn. Photos by SUNPAPERS—Joshua S. Cosden, and Bob Garland.

Dr. Frank G. Back and Dr. Orrin S. Wightman; Jayne Quellmalz and Harry Shigeta; W. Chase and R. Moudry of Revere Camera

At the Exhibition Opening—Adolf Fassbender, Mrs. Barbara Green, John R. Hogan, Mrs. Hogan, Mrs. Franke Fassbender.

Karl Emery, Convention Chairman, Mrs. Adelyn D. Breeskin, Director of the Baltimore Museum of Art, and Wilbur Harvey Hunter, Director of the Peale Museum.

don't let Bruce catch you with anything contrived!)

Don't think for a second, though, that Captain Graf was the only one to be photographed on that trip. Maybe he accounted for a few more exposures than anyone else but others did some posing too. There were a couple of "Pops" who always obliged: Pop Jordan with his beret and Windsor tie, and Pops Whitesell with his white hair and padded jacket. There was Miss Maryland of 1949, beautiful Ann Urie, a couple of other pretty models and the "cheesecake" set-up on top of a teetering step ladder, arranged by Dave Eisendrath, Frank Scherschel and Bob Garland.

When anyone ran out of people to take, there was the boat itself, the water, the docks and the shipping all around. Baltimore Harbor and Chesapeake Bay never got such a concentrated photographic going-over in all its life, and probably never will again, at least not until the PSA convenes in Baltimore for a repeat performance. The ship rails bristled with cameras the whole time, because when a spot was vacated by somebody who got hungry for oysters or thirsty for beer, there was another to fill his place. The statisticians estimate that there were exactly 14,731 separate exposures made on the cruise, not counting movies. Figure it out for yourself. There were 493 passengers on board, every one with a camera, a lot of them with two and some even with three. They averaged two rolls apiece, and that added to all the speed Graphic shots on cut film brings it out to 14,731.

The cruise down the Bay was a huge and happy success but it couldn't overshadow the rest of the convention because there was a succession of outstanding events. The main trouble was you couldn't be in enough places at the same time during

Dr. Edwin H. Land receives his Fellowship from Pres. Mulder; Philippe Halsman, Doris M. Weber; H. B. Tuttle and Pres. Mulder.

AT THE TECHNICAL LUNCHEON—Norman Lipton, William H. Fritz, Edward Noel; Frank Carlson, William Swann, Paul Arnold; Harry Lerner, Theron Holden, George Eaton.

the days when the various divisions were presenting separate programs simultaneousiy. If you heard Ed Bafford on bromoils you had to miss Dave Eisendrath's jovial act on camera equipment or the clinic on color with a whole board of experts to answer your questions. If you heard Whit Standish in his superb talk about making better pictures, you couldn't see Roy Bulger's slide show on New England and if you "caught" Edward Hill and his phenomenal film, "Invisible Motion," you just never did get to the PD meeting. And all the while these were going on, there were those interesting papers put on by the Technical Division. You wished you could be in three places at once most of the time. But that's the way of conventions and you had to take it as it comes.

Anyway, there were no conflicts in the evenings so nobody had to miss Philippe Halsman on Friday and nobody much did either. The hall was packed and the laughter the most explosive of the whole convention, especially when he told how Dali proposed to suspend a duck in midair for that famous surrealistic photograph where everything seems to be floating in space. They had to make the shot over and over to get it right, so luckily they settled on a couple of cats tossed into the air and didn't have to dynamite 28 ducks. The talk was a terrific show done by a master showman, whose humor, both conscious and unconscious (or was it?) had the place in an uproar most of the time. Doris Weber surely had an inspiration when she snagged Halsman for the convention.

The Panel Discussion

Speaking of explosions, maybe the 1950 Convention will be remembered for the minor one which took place in the Calvert Ballroom on Saturday morning. That was

AT THE COLOR DIVISION LUNCHEON—(Speakers' Table) H. J. Johnson, John G. Mulder, George F. Johnson, A. C. Klein, Paul J. Wolf, Mrs. Blanche Kolarik.

Dave Eisendrath demonstrates one of his gadgets before a Photo Journalism Division lecture.

John R. Whiting; Marion E. Warren, Frank Scherschel, Bob Garland, H. A. Schumacher; Dave Stickel at Photo Journalism Lectures.

George M. Rowan, H. J. Johnson; Paul J. Wolf, H. S. Sayre, Edward A. Hill; Pres. Mulder signs up E. J. Fick and C. L. Coleman.

when John Hogan snapped shut his little trap on the anti-pictorialists. There was chortling and glee among the pictorialists, slight consternation among the "antis" and much yakkity-yakking about it by everybody all day long and far into the night. You heard what happened, didn't you? It was in the panel discussion on the validity of pictorial photography, with Adolf Fassbender and John Hogan upholding the slide of pictorialism and Jacob Deschin and Bruce Downes pleading for something more realistic. In his argument, John laid down some dogmatic principles as to what constitutes a good photograph. In rebuttal, Bruce had some sharp words for anyone who would set himself up as such an authority on art. Then the trap closed with a bang. John explained that he wasn't the authority. He was merely quoting from two books, which he held up. One was "Say it with Your Camera" by Jacob Deschin, and the other, "Photography with a Ciroflex" by Bruce Downes. There were a couple of sheepish grins at the other end of the table and gasps of amazement among the audience. Maybe it didn't clinch the argument (Nothing ever will!) but it was the neatest trap of the year, inside photography or out.

Final highlight was the surprise at the banquet put on by the boys in the Photo-Journalism Division, the movie story of the boat trip. How they ever managed to get that film processed and edited in 48 hours is their secret, but there it was right on the screen. There was Convention Chairman Charles Emery in his green beret and Co-Chairman Ed Bafford in his checked shirt, all the PSA bigwigs from John Mulder down, the gang crowding around for shots of that bushy white beard, or stretching over the rail to catch the geysering fireboat. There were the groups of people chattering away, the plates of food and the pitchers of beer, Barbara Green looking charming as ever even while swallowing raw oysters, and the whole 493 having a whale of a time. That film was the finishing touch to four days of wonderful programs.

It was a swell convention, beautifully planned and skillfully executed. Nobody got much sleep, but sleep, what's that? Something you can do back home any old time. Instead you spent the time before, between and after the scheduled sessions seeing old friends, meeting a lot of new ones, and having a few agonized moments trying to remember names or keep faces hitched to the right tags. Worst trouble was being introduced to someone, either not catching the name or promptly forgetting it and then spending the rest of the day trying to sneak a look at his badge to find out who he really was. Still, it didn't matter much, everyone was so friendly, and by the time the Honors Banquet was over and the 1950 Convention all wrapped up, everybody agreed it had been one of the very best.

Rex Frost's Comments

Adolf Fassbender, John Hogan, Bruce Downes and Jacob Deschin likely will go down into history as the Fathers of the mid-20th century American Photo Revolution. With valuable assist by Maurice Tabard of Paris, France, surrealist-solarisation cameraman extraordinary. They stole most of the show at the 1950 PSA Convention. At least for this observer's money.

Adolf, John, Bruce and Jacob humpty dumped contemporary photography off the wall. Maurice pieced together some of the broken shell with a demonstration of imaginative modern photo concepts. PSA'ers, who pride themselves on being pictorialists, will probably still be wiping the yolk off their clothes.

Contemporary Photography. What's wrong with it? Today's pictorialists haven't grown up with the times. Lack imagination. Have too many bosses.

Bosses? Yes, bosses. The press man working to please his city or art editor. The salon exhibitor planning to satisfy a jury. The portraitist having to please a cash client who wants to be glamourised, characterised, rejuvenated, etc., etc.

Result? Dull, repetitious, stereotyped salons. Uninspired club meetings where

NATURE SPEAKERS—Earl H. Palmer, Louise Broman Janson, Mark Mooney, Dr. Russell Brown, Sam Dunton. DETROIT GUILD PAST-PRESIDENTS: J. Elwood Armstrong, E. W. Brown, Laverne L. Bovair, L. F. Cross, Dr. C. J. Marinus, Isadore A. Berger.

print critics dish out the same old monotonous, antiquated clichés week after week. Pictorialists, striving to please the bosses, the juries, the critics, and therein forgetting primarily to please themselves.

While photography is plagued with bosses, other people to satisfy, it will never become a full blooded art. Pictorialists haven't matched the individualism shown by 20th century artists of brush and pen. That's what the experts said in breezy old balmy-aired Baltimore.

What to do about it? Quit making prints. Start making pictures. Interpret rather than illustrate. Evolve and work out an idea which swells from within you yourself. Say something with your picture. Simplify it down to a single main accent in which auxiliary detail is subordinated. Let your own individualism express your awareness of the mood and atmosphere of

(Top left) Maurice Tabard, Mrs. & Mr. Herb Howison. (Right) Members of Exhibitions Committee and Pops Whitesell. (Bottom left) Ollie Atkins, Bob Garland, Anne Urie. (Right) Technical Division presents gift to Frank Carlson—Ed Noel, Vera Wilson, Dr. H. C. Carlton, Carlson. (Opposite left) Pres. Mulder presents Honorary Fellowship to John G. Capstaff. Photos by F. Quellmalz, Jr.

things about you. Don't imitate. Experiment with various ways and means of achieving your objective. Don't be too literal. Think beyond the obvious. Originate. Be yourself.

That's what the experts prescribed at jolly old buoyant Baltimore. The conventioneers enjoyed the ride. Laughed when the big-shot panel disagreed among them-

H. C. Colton, Gus Wolfman, Fen Small; Mrs. & Mr. A. M. Armstrong, Mrs. Vinc Hunter; Vincent H. Hunter, WMAR-TV expert.

CONTEMPORARY PHOTOGRAPHY PANEL DISCUSSION—Jacob Deschin, Bruce Downes, Norris Harkness, John Hogan, Adolf Fassbender.

selves as to the symptoms of the patient and the solutions. Gulped and swallowed the cross talk. Complemented it with gulped down chasers of Chesapeake Bay oysters, taken on the boat ride.

For Canadians, it was benign old Baltimore. Five Canucks were given PSA Honors. More than in any previous year of the Society's history. Dick Bird, Regina, Sask naturalist photographer clicked for a Fellowship. Port Dover's Harry Waddle, Victoria, B. C.'s Jim McVie, Edmonton, Alberta's Alfred Blyth and Quebec City's George Driscoll earned the Society's Associate degree. The two easterners accepted the Awards in person and got an enthusiastic hand.

In sum total, Baltimore was a good show. Toronto could give PSA Color Slide Exhibition organisers points on running a SMOOTH projection show. Eastern Canadian Camera Clubs could learn something from the informality, the friendliness and the overall hail-fellow-well-met cordiality which make club activities and conventions click along so warmly in the land of Uncle Sam.

Convention Highlights

Food consumed on the boat trip by 474 photographers—8000 oysters, 1000 clams, 60 gal. clam chowder, 1000 slices cheese, 2600 slices meat, 50 loaves bread, potato salad, soft drinks, 5 barrels beer.

Emery's three short blocks to the hotel, true or false contest on the boat trip.

Henry Lester's brandy and Erle Buckley's prunes.

Ralph Gray's movies and Mrs. Harold L. Medbery's slides and wit.

Ed Hill's synchronization of slides and movies with the help of Foster Moyer.

Lyall Cross' Detroit slides and 1951 Convention badges.

Navy's celebration of its first football victory of the season.

Ray Moudry of Revere Camera and his assistance with the tape recordings.

The Baltimore *Sun's* coverage of the Convention and Joshua S. Cosden's press photos.

The Executive Committee of the Technical Division's meetings from 6.30 to 11:30 PM. The best attended Board Meetings in PSA's history.

The launchings at Sparrows Point and in room 1252.

The tribute to John S. Rowan.

Exhibition Listing

Thirty-eight open pictorial exhibitions allowing a maximum entry of four prints per person and hanging more than 125 prints have been held and have published catalogues since July 1, 1950. In addition to the 27 exhibitions reported last month this tabulation incorporates information from the following newly reported exhibitions: Witwaterstrand, Evansville, Melbourne, Pasadena, Windlesham, Luxembourg, Dublin, Paris, Arizona, Southampton, and St. Louis.

The following exhibitors have had 25 or more prints accepted:

Name	*Country*	*Exhibitions*	*Number of Acceptances*
Frank J. Heller	USA	36	95
Harry L. Waddle	Canada	30	82
Doris M. Weber	USA	30	80
Eleanor P. Curtis	USA	26	69
Jack Wright	USA	27	69
H. R. Thornton	England	23	60
G. L. Weissenburger	USA	26	59
Eugenia Buxton	USA	31	59
T. L. Bronson	USA	25	58
Alfred Watson	USA	29	58
J. W. Galloway	Canada	21	47
Charles Wilson	USA	19	46
Charles Manzer	USA	23	46
A. R. Casaco	Portugal	22	42
H. W. Wagner	USA	19	41
Karl Pollak	England	12	40
J. O. Echague	Spain	14	40
O. E. Romig	USA	16	40
Jose Otticica	Brazil	20	40
Boris Dubeu	USA	14	39
J. A. McVie	Canada	15	37
Francis Wu	Hong Kong	16	37
Erno Vadas	Hungary	13	36
Axel Bahnsen	USA	15	35
Helen Manzer	USA	15	34
M. W. Tilden	USA	17	33
J. Benjamin	England	12	31
L. Miller	USA	13	31
M. M. Deaderick	USA	10	30
Earle W. Brown	USA	13	29
Tibor Csorgeo	Hungary	14	29
K. Pazovski	England	13	25

It is interesting to note how many different countries are represented by the current leaders in the exhibitions.

As stated previously, due to limited manpower, we shall be unable to answer any correspondence in connection with this listing but we shall be happy to hear of any corrections that should be made.

NEW MEMBERS OCTOBER 1950

New Members	*Nominators*
Aaron, Lewis, Boston, Mass.	D. E. Gading
Addicott, Miss G., Cincinnati, Ohio	P. Cass
Anderson, Roland, Detroit, Mich.	A. Gingrich
Andrew, Joseph, Lafayette, Ind.	Membership
Barker, I. C., San Francisco, Calif.	P. Cass
Barnett, James, Montreal, Canada	S. Vogan
Becker, E. Allen, Baltimore, Md.	P. Cass
Benjamin, L. R., E. Cleveland, Ohio	E. Noel
Bergaud, Jean, Paris, France	F. Quellmalz
Bickford, Robert, San Francisco, Calif.	P. Cass
Binko, Joseph, Baltimore, Md.	P. Cass
Bowman, Lee, Wollaston, Mass.	F. Jordan
Boyd, Dr. F. M., Lima, Ohio	Membership
Breidenbach, R., Pittsburgh, Pa.	A. L. Young
Broadhead, Eleanor, Salem, Mass.	C. Goodchild
Bruhl, Mr.&Mrs. C., San Bernardino, Calif.	P. Cass
Carey, Harold, Yakima, Wash.	P. Cass
Carstens, R. H., Mt. Ranier, Md.	P. Cass
Clark, W. A., Denver, Colo.	Dr. M. Giesecke
Colwell, Mrs. J., Champaign, Ill.	R. Meiss
Cramer, Harold, Hickman Mills, Mo.	A. Norbury
Cummings, Charles, San Diego, Calif.	C. Wilson
Davis, D. D., San Francisco, Calif.	J. Mengel
David, H. V., San Francisco, Calif.	P. Cass
Dekur, Wm., Long Branch, Canada	J. Galloway
Dewey, George, Buffalo, N. Y.	J. S. Nixon
Dick, John, Victoria, Canada	J. McVie
DiCostanzo, P., Brooklyn, N. Y.	F. Fassbender
Dingus, Ruth, Honolulu, T. H.	H. Seldidge
Donges, Ralph, Kenilworth, Ill.	Membership
Dunham, C. Edward, Baltimore, Md.	P. Cass
Eaton, William, Toronto, Canada	O. W. R. Smith
Ettinger, Mrs. L., Chicago, Ill.	J. Walman
Evers, Harry, Pasadena, Texas	Membership
Fidler, Miss M., Detroit, Mich.	P. Cass
Forman, Irwin, New York, N. Y.	Membership
Fox, Ray, Springfield, Ohio	A. Bahnsen
Fraser, Frank, Chicago, Ill.	M. Kople
Gallagher, John, Evanston, Ill.	P. Cass
Garrett, E. T., Phoenix, Ariz.	L. Mahoney
Goldman, S., Castle AF Base, Cal.	H. Thornhill
Graham, V., New Hyde Park, N. Y.,	R. Martinsen
Greenidge, Gerald, Brooklyn, N. Y.	Membership
Griffin, Leonard, Dayton, Ohio	H. Johnson
Hamilton, Stanley, Appleton, Wis.	E. Byrsdorfer
Hammack, Nottley, Los Gatos, Calif.	C. Prusman
Hammer, Allan, Franklin, N. H.	P. Cass
Hand, Orvil, Hopewell, Va.	W. Booth
Hannigan, Edward, New York, N. Y.	F. Small
Hardy, Miss O., Toronto, Canada	S. Vogan
Heath, Rodier, London, England	H. Schwartz
Heidrick, August, Reading, Pa.	F. Quellmalz
Hem, Claude, Lancaster, Pa.	F. Quellmalz
Hooker, Miss G., Oxford, Md.	T. Firth
Hopkins, John O., Wilmington, Del.	Membership
Ilani, E. F., Tel Aviv, Israel	I. Berger
Jennings, Cora, Greenport, N. Y.	Membership
Johnson, J. T., Santa Barbara, Calif.,	M. Deaderick
Johnson, J. L., Seattle, Wash.	S. Thronson
Johnson, R., Quincy, Ill.	Membership
Kellermann, C., So. Pittsburg, Tenn.	H. Jackson
Kennedy, James, Chicago, Ill.	Membership
Kerwood, Gerald, New York, N. Y.	F. Fassbender
Kinnear, C., Cleveland, Ohio	J. Langlotz
Knauerhase, Dr. O., New York, N.Y.,	F. Fassbender
Kossuth, George, Wheeling, W. Va.	P. Oelman
Lamb, Miss Katherine, N. Y., N. Y.,	B. Standish
Lauridsen, Erik, Chicago, Ill.	P. Cass
Leidy, Thomas, Boyertown, Pa.	F. Quellmalz
Letourneaux, P., Chicago, Ill.	D. Pritchard
Lewis, A. W., Odebolt, Iowa	E. Royky

PSA TRADING POST

Open to individual members, free of charge. Limit 25 words each. Copy closes the tenth of the second preceding month before publication.

For Sale—Depthro projector for Realist Three Dimension Slides. TDC 50x50 Stereo Screen. Both for $75.00. P. J. Wolfe, P. O. Box 332, Butler, Penna.

For Sale—5"x7" Solar Enlarger, 5½" Ilex lens, foot switch, easel, 4x5 printer, 4x5 Pacemaker Speed Graphic w/6½" coated Ektar in flash shutter, range-finder. New, best offer. Norman Shaifer, 120 Liberty St., New York 6, N. Y.

For Sale—4x5 Busch Pressman-View Focus—135 Raptar in Synchromatic shutter. Busch Solenoid & Busch battery handle & reflector. Like new—$200.00. New Adapta-Roll $25.00 extra. Jess R. Baker, Box 360, Ontario, Oregon.

For Sale—Bausch & Lomb Protar Series VII f/6.3, 6¼"–11 3/16 in Volute shutter, $30. Schneider Symmar (Dagor Type) f/6.8, 18cm in compur (coated) $40. Cooke Telar f/7, 13½" in bbl., $30. Mortimer L. Friedman, 5016 Third St. N.W., Washington 11, D. C.

For Sale—2¼x3¼ Speed Graphic, f/4.5 Zeiss Tessar, case, accessories. Write for list and prices. Ralph M. Ashcraft, 112 W. Jackson, Macomb, Illinois.

Lightbody, Miss A., Ritzville, Wash., A. Kendrick
Lippman, Dr. M. C., New York, N. Y.....M. Polk
Lockwood, L. B., Cleveland, Ohio.....R. Koch
Lord, Donald, Butler, Pa.....P. Wolfe
Lucca, Roberto, Caracas, Venezuela.....R. Gray
Milgram, Joseph, Philadelphia, Pa.....J. Mulder
MacMullin, Smith, Inglewood, Calif.....M. Ewell
Marshall, H., Shaker Heights, Ohio...H. Howison
Mason, H. J., Los Angeles, Calif.....P. Cass
McDonald, J., San Mateo, Calif.....W. Callow
McMillion, Mrs. E., Gov. Is., N.Y., F. Fassbender
Menard, Ivan, Malvern, Arkansas....Membership
Miller, H. G., The Dalles, Oregon.....L. Foster
Miller, Ralph, Washington, D. C.....H. Shaw
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Nov. Print of the Month Contest

EARLY AMERICAN C. J. Perry

The eighth judging of the Print of the Month Contest was held in Rochester, N. Y. with the following results announced by judges Leon C. Forgie, Louis J. Parker, and Alfred H. Hyman.

Beginners Group, Nature Class
1st—H. J. Mahlenbrock, "Mums"
2nd—Lee Marshall, "Hens and Chickens"

Beginners Group, Action Class
1st—H. J. Mahlenbrock
2nd—Dr. Louis Manon Valdez, "Running Water Pattern"

Beginners Group, Pictorial Class
1st—Eliot C. French, "Due East and West"
2nd—Charles J. Perry, "Early American"

Advanced Group, Nature Class
1st—Wellington Lee, "Butterfly"
2nd—Larry D. Hanson, "Eternal Triangle"

Advanced Group, Action Class
1st—G. L. Weissenburger, "El Toro"
2nd—J. Elwood Armstrong, "Flying Spray"

Advanced Group, Pictorial Class
1st—Wellington Lee, "Abstract Dance" (See cover).
2nd—Eugenia Buxton, "Into the Sun"

THE RULES

1. There is no entry fee.
2. All active PSA members (individuals) in good standing are eligible, including foreign members.
3. Each member may submit one print per month in each class (total of 3 prints —see rule 13.)
4. One competition will be held each month.
5. Closing date for receipt of pictures at PSA Headquarters is the last day of each month. Pictures arriving late will be placed automatically in the competition for the following month.
6. All prints submitted become PSA property. They will *not* be returned.
7. Reproduction rights are granted to PSA when pictures are submitted.
8. For each winning print, a "PSA Print of the Month Medal" will be awarded. Winning prints and pertinent contest data will be printed in PSA JOURNAL as funds and space permit.

FLYING SPRAY J. E. Armstrong

BUTTERFLY Wellington Lee

MUMS H. J. Mahlenbrock

9. Winners for the preceding year will be judged annually at the PSA Convention to pick the "Print of the Year" in each class.
10. Pictures by any photographic process are eligible.
11. Print size shall not exceed "8 x 10."
12. Film exposure must have been made by the entrant. Prints may be made by the entrant or by a photofinisher.
13. The following are the classes of entry:

DUE EAST & WEST E. C. French

Classes	*Beginner Group **	*Advanced Group ***
Action	1 medal	1 medal
General Pictorial (scenic, portrait, genre, etc.)	1 medal	1 medal
General Nature (animals, plants, flowers, pets, etc.)	1 medal	1 medal

* Anyone who has not (prior to day of entry) had a picture accepted in an International Salon or Exhibition of Photography is classified as a "Beginner."

** Anyone who has had a picture accepted in an International Salon or Exhibition is eligible only in the Advanced Group. Any beginner winning 3 "PSA Print of the Month" awards automatically transfers to Advanced status.

The January competition will be for Christmas and New Year cards only, according to the following classes.

	Beginner	*Advanced*
Appropriate scenes	1 medal	1 medal
Humor	1 medal	1 medal
Table tops and other synthetic scenes	1 medal	1 medal

14. PSA assumes no responsibility for notifying competitors of arrival of prints. Members wishing such notification should include a stamped self-addressed postal card to be filled in by Headquarters staff. A suggested message is: "Prints for competition arrived on ....."

15. Include the following data on the back of each print entered. Prints without this information cannot be judged.
Maker's name
Maker's address
Group (Beginner or Advanced)
Class (Action, Pictorial, or Nature)
Further data will be requested for winning prints.

16. Send prints to:
PSA Print of the Month Contest
2005 Walnut Street
Philadelphia 3, Pennsylvania

The Print Contest is judged in a different city each month, although all entries are to be sent to PSA Headquarters as in the past. The schedule of judging and the individual in charge follows:

Month	*City*	*Judges and Judging Arrangements*
Feb.	Cincinnati	P. H. Oelman
Mar.	Baltimore	Ernest C. North
April	Pittsburgh	O. E. Romig
May	Detroit	Dr. C. J. Marinus
June	Cleveland	Doris Martha Weber
July	Atlanta	C. A. Luce
August	Philadelphia	Charles Heller

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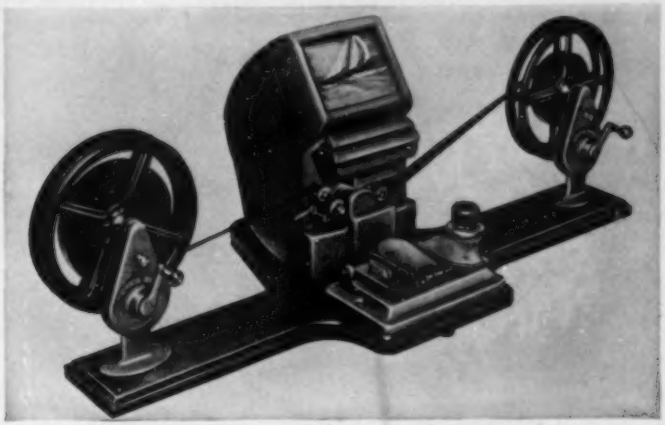

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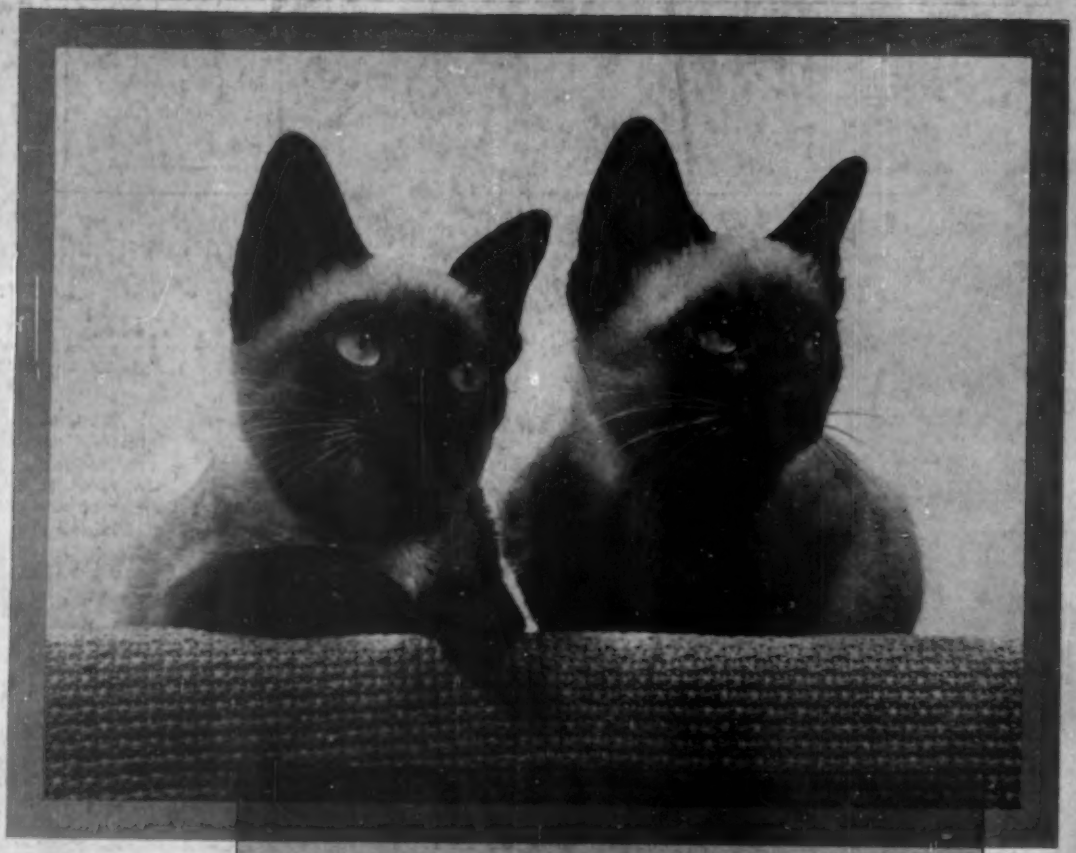

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PHOTOGRAPHIC
SCIENCE AND TECHNIQUE

A quarterly technical supplement to PSA Journal

CONTENTS ☆ FIRST 1951 ISSUE, PUBLISHED WITH VOL. 17, NO. 2 ☆ FEBRUARY 1951

TECHNIQUE FOR

COLOR FILM EXPOSURE INDEX AND FIRST DEVELOPMENT TIMING

H. G. MORSE*

It is possible to vary the density of Ansco Color Film by changing the first development time. This works in much the same way as the control of black-and-white print density by shortening or lengthening the printing exposure.

The sensitometric curves in Fig. 1 represent a series of color film transparencies that received first development times ranging from 4½ to 40 minutes. All other processing treatments were normal. Decreases in first development time leave more silver halide available for the color developer and result in (a) an increase in the detail rendered by the overexposed region, (b) a loss of detail in the shadows and eventually, as times are further decreased, (c) a severe loss in contrast and failure of the highlights to become completely clear whatever the exposure. These last effects are caused primarily by incomplete development of the negative image.

An increased first development time produces little visible change in the negative image but the continued action results in a decreased amount of silver halide available for the color developer and an overall decrease in density of the final transparency. This lessens the exposure required to produce clean highlights. Rendition of shadow detail is not improved but shadow densities are reduced. Shortened exposure times compensate for the lack of negative density until severe underexposures are encountered

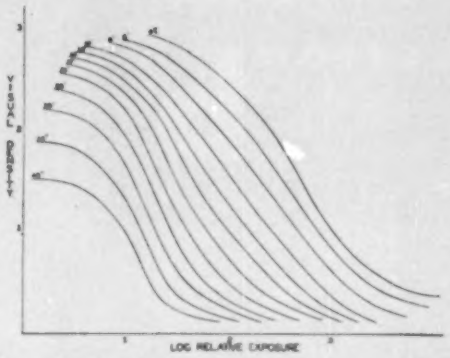

Fig. 1. Characteristic curves showing the effect on Ansco Color Film of variations in the time of First Development. All other processing times were normal.

which will not give a normal density print unless the clear film which is the deepest shadow is printed an undifferentiated medium grey instead of having shadow detail down to the deepest black as is found in a print of a correctly exposed negative. Transparencies processed using extremely long first development times have clear or rather low density shadows which are undesirable for contrasty subjects. For normal subjects a maximum density of 2 gives acceptable shadow rendition.

The color changes caused by variations in the time of first development are small. Color balance shift over a range of first development times from 10 to 28 minutes is on the order of a four series color compensating filter combination. Different emulsions show differences in color balance shift but in general the direction is toward the cyan whenever extremely long or short first developing times are used. The red-sensitive emulsion layer, which is

*Standards Dept., Ansco, Binghamton, New York. Adapted from a paper "Processing Ansco Color Film" delivered 22 October 1949 at the PSA Convention in St. Louis, Missouri. Received 14 December 1950.

FIRST 1951 ISSUE — VOLUME 17B, NUMBER ONE — PUBLISHED WITH THE PSA JOURNAL FOR FEBRUARY 1951

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Fig. 2. Characteristic curves showing the effect on Ansco color film of variations in the time of Color Development. All other processing times were normal. The data were obtained in the non-irritating color developer formula containing S-5.

cyan colored in the final transparency, is the lowest of the three layers, protected by the green sensitive and blue sensitive layers above it. With extended first development times this protection slows the first development of the cyan layer slightly leaving more silver halide in this layer than in the other two, and a denser cyan image after the color development. With extremely short first development, the time required for the solution to penetrate to the lowest layer becomes an important factor, again resulting in a cyan color balance. Extremely long or short first development times cause serious losses in color saturation as well.

Changing time of the second development or color development is not recommended. Such changes have little effect on the exposure index. Increased times produce very little change in the characteristic curve while considerably decreased times reduce the contrast, the color saturation and the maximum density. Figure 2 shows a family of characteristic curves for the final transparency produced by a range of color development times. These are similar in general shape to the curves from an ordinary film developer.

Figure 3 illustrates the relationship between time of first development and exposure index for practical viewing or projection based on exposures required to give transparencies of the same overall density. The solid portion of the curve includes the maximum range of first developing times that can be expected to give acceptable quality transparencies. The dotted portions of the curve show times which may be expected to give transparencies that are unsatisfactory because of color balance shifts, poor color and tone rendition, or low maximum density.

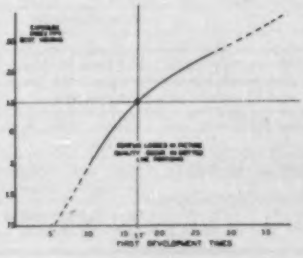

Fig. 3. Effect of variations in the time of first development upon the exposure index of Ansco Color Film. The solid portion of the curve indicates the usable range without objectionable changes in color balance or loss of picture quality.

First development times to give optimum density transparencies with films exposed at various exposure indexes are shown in Table I. The range between 14 and 20 minutes allows an increase or decrease of two thirds of a stop from the normal exposure index of 12 with only minor changes in contrast and color. The shortest and longest times are useful in cases when changes in color balance up to a four series filter combination and moderate changes in contrast and maximum density are tolerable. All times are given for a temperature of 68F and intermittent tank agitation.

This method of controlling a film's exposure index by changing first development is of little use in salvaging an incorrect exposure that is unsuspected until one turns on the light and is confronted with the result. It does, however, have considerable value in cases where a photographer knows he has an exposure error.

Table I

VARIATION OF EXPOSURE INDEX OF ANSCO COLOR FILM DUE TO CHANGES IN TIME OF FIRST DEVELOPMENT

Exposure Index	First Development Time*	
3	10 Minutes	
4	11 Minutes	
5	12 Minutes	
6	13 Minutes	
8	14 Minutes	
10	15½ Minutes	Optimum Quality Range
12 Normal	17 Minutes	Optimum Quality Range
16	18½ Minutes	Optimum Quality Range
20	20 Minutes	
25	22 Minutes	
32	24½ Minutes	
40	28 Minutes	

* At 68F with intermittent tank-agitation.

The photographer who has a series of pictures to make on location or with a large studio set up or with models can have the insurance provided by a series of trial exposures without having to waste time waiting for the tests to be processed before making final exposure adjustments. Trial exposures can be made along with the final ones, with any necessary adjustments in first development time made in the main development after the trials have been processed and evaluated.

The sports photographer or the photographer working under adverse conditions has the advantage of what amounts to a super speed color film available for those times when the conflicting requirements of depth of field, shutter speed and available light—not to mention the maximum lens opening available—meet head on. A practical exposure index up to 40 allows many ordinarily impossible exposure situations to yield good color pictures.

DEFECTS OF COLOR FILM TRANSPARENCIES

Here are two tables which cover most color film transparency defects . . . use them to trace causes for your troubles and to find suggestions for their prevention. The data are reprinted by permission from the "Anseonian" published by Ansco, Binghamton, New York and are copyright 1950 by General Aniline and Film Corporation.

TRANSPARENCY DEFECTS are tabulated here in two tables. Organizing defects into two separate groups makes it more convenient to find information which applies to specific difficulties; Table I deals with defects arising from improper handling, lighting and exposure—in short, defects caused by matters other than processing. Table II is concerned primarily with defects traceable to processing faults or variations.

In using the tabulations of transparency faults, it should be remembered that many defects are not caused by any one error, but are often the result of a combination of errors. As a consequence, there is a certain amount of overlapping.

Since the variables which may be involved are sometimes numerous, it is not always possible to point out one isolated cause and state that it alone is responsible for the fault in question. On the other hand, these tables cover the great majority of common transparency faults, and their most common causes.

Commercial color finishers generally have accurate laboratory control over their processing conditions. With features such as scientifically-developed solution replenishment systems, automatic temperature control and experienced darkroom technicians, it is extremely unlikely that processing deficiencies will be encountered. However, if you do your own processing, Table II may prove helpful in tracing transparency faults.

TABLE 2. DEFECTS OF COLOR TRANSPARENCIES CAUSED IN PROCESSING

Appearance of Defect	Probable Cause	Suggestions For Prevention
Overall lack of density.	Overdevelopment in first developer, exhausted short-stop after first developer, insufficient second exposure, insufficient color development, contaminated color developer.	Follow time and temperature and exhaustion recommendations carefully.
Excessive density with overall muddy appearance.	Insufficient first development, exhausted or overaged first developer, insufficient agitation or low temperature in first developer.	Agitate as recommended, do not overwork first developer.
Excessive density with exaggerated colors and contrast.	Overdevelopment in color developer, caused by immersion in color developer for too long a period, or at too high a temperature.	Closely follow time and temperature recommendations in color developer.
Light, weak and unsaturated colors.	Underdevelopment in color developer, caused by immersion in color developer for too short a time, or at too low a temperature. Exhausted or contaminated color developer.	Observe time and temperature recommendations for color development.
Brownish streaks or spots.	Incomplete bleaching caused by too short a time in bleach bath, exhausted or overaged bleach, lack of agitation in the bleach.	Rebleach, fix and wash; defect can sometimes be eliminated.
Grayish, dull colors with normal overall density.	Incomplete bleaching caused by too short a time in bleach bath.	Rebleach, fix and wash. Defect often can be eliminated.
Overall brown-gray stain.	Insufficient washing between the hardener and the bleach.	Give thorough agitation in all solutions and washes.
General greenish cast.	Transparency exposed to fumes (such as sulphur dioxide) while drying.	Rebleach for about 3 minutes, fix and wash.
General bluish cast.	Insufficient agitation throughout processing procedure.	Agitate films in all baths and washes.
General reddish cast.	Incomplete second exposure, insufficient washing before color development.	Expose films from *both* sides during second exposure. Wash thoroughly.
General milky appearance.	Incomplete fixation.	Refix and wash.
Reticulation.	Insufficient hardening, soft wash water, second exposing light too warm, solutions or wash water above recommended temperature.	Use fresh hardener, check solution and water temperatures, give second exposure under water in tray.
Scratches and abrasions.	Rough or improper handling of the film during processing, insufficient hardening.	Handle color films with care, use fresh hardener.
Stains and streaks.	Contamination of solutions, insufficient agitation, insufficient washing. Careless handling of film.	Mix new solutions, agitate thoroughly throughout processing. Clean equipment.
White crystalline deposit on film surface.	Insufficient final wash.	Give recommended final wash, wipe films with soft chamois or sponge.

TABLE 1. DEFECTS OF COLOR TRANSPARENCIES CAUSED BY HANDLING BEFORE PROCESSING

Appearance of Defect	Probable Cause	Suggestions For Prevention
Clear transparency, no image.	Very severe fogging by exposure to light before processing. Film holder slide unintentionally removed while shutter was open. Possibly shutter was set at B or T, or defective shutter.	Load sheet film in total darkness, roll and 35mm films in subdued light. Check shutter.
Black opaque transparency.	Film not exposed. May be caused by failure to remove slide from holder for exposure, failure to remove lens cap or cock shutter. Possibly defective shutter or cable release.	Check exposing procedure, also check shutter and cable release.
Light transparency, weak colors.	Overexposure. May be caused by inaccurate estimation of prevailing light conditions, improper use of calculator or exposure meter. possibly defective shutter which gives too slow exposures.	Use care in estimating light conditions, use higher shutter speed or smaller lens opening.
Pinkish transparency.	Exposure to light of too low a color temperature (for example, house lamps). See reference to reddish transparency, and Chart II on general reddish cast.	Use 3200K lamps for Ansco Color Tungsten, use Conversion Filter No. 10 with Ansco Color Daylight indoors.
Reddish transparency, defect more pronounced in shadows.	Exposure to red safelight during loading or unloading. Possibly use of clear flash, instead of blue.	Load films in total darkness. Selective reduction may help slightly.
Reddish images in outdoor scenes.	Exposures made too early or too late in the day.	Exposures should be made between 2 hours after sunrise, and 2 hours before sunset.
Overall red or orange transparency.	Use of color filter intended for only black-and-white photography.	Do not use black-and-white filters for color film, Selective reduction may assist.
Overall reddish-brown transparency. Image reversed, and transparency is too dense.	Film exposed through the base. Film holders were incorrectly loaded with emulsion side in.	Always check film notches and load emulsion side out.
Overall green transparency.	Exposure to green safelight during loading or unloading. Use of outdated film, or film subjected to adverse storage conditions (high temperatures and humidities.) Exposing color film to fluorescent illumination without using proper filter. (Possibly due to use of green filter intended only for black-and-white photography.)	Load films in total darkness. Check expiration date on film carton, keep film in a cool, dry place. Use Conversion Filter No. 13 with white fluorescent only. Selective reduction may assist.
Dark transparency with bluish shadows.	Underexposure. May be caused by inaccurate estimation of prevailing light conditions, improper use of calculator or exposure meter. Possibly defective shutter or cable release.	Use care in estimating light conditions, using calculators and meters. Check shutter and release.
Overall bluish transparency.	Exposure to light of too high a color temperature, as Ansco Color Film Tungsten Type to sunlight without Conversion Filter No. 11, or to flood or clear flash lamps without proper U-V filter. Also exposure of daylight type film outdoors in shade or on overcast days.	For best color transparencies use direct sunlight, and front lighting. Illuminate shadow areas with flash, reflectors, etc. Use filters when required.
Highlight areas thin, shadow areas dark.	Excessive contrast in subject lighting.	Generally subjects appear more pleasing when front-lighted, with shadow areas illuminated.
Local off-color areas in otherwise normal transparencies.	Reflection from nearby colored objects, or the use of lights of different color temperatures. Possibly reflector is not neutral in color.	Watch for reflections from nearby colored surfaces. Do not mix light sources.
Overall yellow transparency.	Film exposed too near sunrise or sunset when sunlight has yellowish cast. Possibly use of yellow filter intended only for black-and-white photography.	Expose color films between 2 hours after sunrise, 2 hours before sunset.
Light area usually near center, often red in color.	Lens flare. Occurs when direct rays of strong light (either sunlight or artificial light) shine into lens, causing unwanted reflections.	Use sunshade to prevent light from entering lens, set up so light does not shine into lens.
Irregular transparent streaks.	Light leaks in the body, bellows or shutter of the camera.	Have camera checked by competent repair man, or manufacturer.
Fuzzy, indistinct images, sharp background.	Camera focused for background instead of for subjects. Possibly subject movement or non-focusing camera too close to subject.	Focus carefully on subjects, use higher shutter speed for moving subjects.
Overall fuzziness of images.	Camera movement at time of exposure, lens not properly focussed. Possibly lens is dirty or out of position.	Focus accurately. Hold camera steady as shutter is released. Check lens.
Light transparency with two or more images superimposed.	Double or overlapping exposures, caused by taking two pictures on same film area. Film holders not properly identified, or not advancing frame of roll or 35 mm film.	Carefully note exposed holders, always advance film fully immediately after each exposure.

TABLE 1. DEFECTS OF COLOR TRANSPARENCIES CAUSED BY HANDLING BEFORE PROCESSING

Appearance of Defect	Probable Cause	Suggestions for Prevention
Transparent or weak areas along the edge of the film.	Edge fog. May be caused by loosely-wound roll film, defective or improperly handled film holders and 35mm cartridges.	Load and unload film in subdued light, use care in handling holders, rolls and cartridges.
Scratches and abrasions.	Foreign particles in camera or film holder. Possibly caused by "cinching" roll and 35mm film (pulling roll tight when film is wound on itself.)	Keep camera and film holders clean and free from dirt. Do not pull film tight.
Part of subject out of picture.	Camera not aimed accurately at time exposure was made. Possibly view finder out of adjustment.	Center subject carefully inviewfinder, hold camera steady as shutter is released.
Last exposure cut in half.	Improper manual winding of the film (film advanced too far). Sometimes occurs in cameras having automatic film advance.	Use care in advancing film, check camera instructions on automatic film advance.
Dense transparency.	Underexposure. Shutter speed too high, lens opening too small. Caused by using box camera or slow lens.	Use camera with f/6.3 lens or faster. Use slower shutter speed or larger lens opening.
Transparency partially opaque.	Obstruction (finger, camera case flap, etc.) over lens during exposure. Possibly bellows sag.	Remove obstructions between lens and subject. Check bellows, if any.

NEW DEVELOPMENTS IN NAVAL PHOTOGRAPHY

J. H. McELROY, *Captain*, USN*

The Director of the Photographic Division within the Bureau of Aeronautics, has the responsibility, under Rear Admiral A. M. Pride, the Chief of the Bureau of Aeronautics, to direct the material functions of photography for the Department of the Navy.

The Bureau of Aeronautics is the agency within the National Military Establishment responsible for implementing the photographic requirements of the Navy including the Marine Corps. This responsibility includes research, design, development and testing of complex photographic equipment peculiar to Naval requirements in addition to the many other photographic material functions.

THE JOINT CHIEFS OF STAFF have assigned certain aspects of military photographic reconnaissance to the Department of the Navy. In order for the Navy to fulfill its responsibility on the military team, it is necessary to develop special photographic equipment. This includes specialized cameras which can be utilized effectively from typical Navy photographic "platforms."

These "platforms" are usually very unstable and may be the hands of an underwater demolition team swimmer, a submarine, a surface man of war, a carrier-borne aircraft, or a combat marine under fire in the tropics or frigid polar areas. These requirements are typically Navy. They are primarily the reason why the Navy has to be in the photographic development business. The sought for end-product is up-to-the-minute military intelligence.

The scope of Naval photography is the broadest possible, far greater than that of the other services. It embraces ground, air, surface and underwater photography. The Navy must make photographs in support of amphibious operations. Beach gradients must be determined within an accuracy of plus or minus a half foot. Marine combat landing requirements are peculiar to the Navy. Underwater demolition teams need equipment for photographing and charting obstructions, aerial cameras are required for bombardment charts and photo-intelligence purposes. Submarine periscope cameras are needed for identification of ship targets and for beach line reconnaissance.

In addition the Navy is sponsoring a vast research and development program which employs photography as one of its most useful tools.

The complex problems involved in the research, development and operation of equipment required to obtain photography within and between these separate media can be well appreciated by themselves, to say nothing of the military requirements for around-the-clock coverage under all conditions for which it may be planned to conduct research or military operations. To date, new developments in Naval photography may be generally grouped under five headings: (1) Reconnaissance Photography, (2) Mapping and Charting Photography, (3) Instrumentation or Technical Photography, (4) Photographic Materiel, and (5) Educational or Training Film Photography.

Reconnaissance Photography

Under Reconnaissance Photography the most significant recent developments are the XCA-11 and XCA-12 aircraft cameras. Prototypes of these two cameras will be delivered

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Fig. 1. Combat Camera Type XCP using 70mm film. Official Photograph U. S. Navy.

to the Navy in the immediate future. The XCA-11 is a 70mm continuous strip camera. The XCA-12 is a 70mm single frame image-motion compensation camera. These experimental cameras are being developed by the Bill Jack Scientific Instrument Company and the Fairchild Camera and Instrument Corporation, respectively. The cameras are necessary to met Navy requirements for reconnaissance from supersonic speed jet aircraft. Both cameras are designed for photography at speeds in excess of 1,000 miles per hour and at altitudes ranging from sea level to more than 50,000 feet. The enormous fuel capacity necessary in jet fighters leaves little room for cameras. Therefore, 70mm scaled-down versions of the conventional size, wide-film cameras are vital for future Navy photo-reconnaissance aircraft. The small size of the 70mm cameras makes possible multiple camera installations.

The thumb rule of safety in numbers is one that can very well be applied to combat air reconnaissance photography. The one outstanding difference in the accomplishing of the mission of a photographic reconnaissance aircraft and that of any other type of aerial military mission is that before a photographic flight can be considered complete, the aircraft must have returned safely to base with pictures of the objective. A plane that does not return to base with photographs of the objective serves no useful purpose whatsoever except to illustrate the accuracy of the enemy's interception or the short sightedness of phototechnical personnel in not providing adequate cameras in the airplane. A simple mechanical failure may render an entire mission useless. Multiple-camera installations are good insurance against failure.

The 70mm aircraft camera program has necessitated the development of all the other associated photographic processing equipment to yield conventional size 10 by 10-inch finished prints in a minimum of time. In fact, with this new processing equipment, it is anticipated that the time required to yield a finished print will be considerably shorter than at present with wide film cameras. The 70mm program is the Navy's answer to limited space and weight both in the aircraft and on board the aircraft carrier. It must be remembered that Navy laboratory equipment must be designed compactly enough to be installed in ships.

Equipment now under development in this field is the X-DM-8 film developing machine, the X-POV type 70mm enlarging continuous, and step-and-repeat printers.

Another Navy accomplishment is the development of the deep sea, underwater camera, Type XCPX, which effectively functioned in making underwater films during operation Portrex this year. A magazine feature story on underwater photography was illustrated with full color Navy photos. The Bureau of Ships wanted to secure photographic evidence of the damage to submarine hulls many feet under water at the instant of an explosion. This requirement resulted in the development of special cameras and film for underwater research.

The development of the Mark 4 Submarine Periscope camera with which high quality photographs can be made to record the results of submarine attacks, sea observations, or coastal reconnaissance is an invaluable contribution to military intelligence.

Another very significant development in Naval reconnaissance photography for the support of fast carrier striking forces is the electronic flash enlarger. In the past it was impossible to make good quality enlargements in a shipboard laboratory while the ship was underway, or in a rough sea, because of vibration. This new equipment will permit the making of enlargements on board ships traveling at full speed, regardless of the state of the sea. The enlarger was designed and manufactured by the Navy Aeronautical Photographic Experimental Laboratory at Philadelphia. The prototype embodies the following features:

(a) Exposure equivalent to 1/5000th second.
(b) Accommodates rolls of negatives up to 9½ inches by 200 feet.
(c) Automatic exposure control.
(d) Automatic paper easel accommodates roll sizes up to 10 inches by 200 feet and standard sheet sizes.
(e) Automatically transports and meters paper from rolls, and triggers the enlarger at the rate of 21 cycles per minute.

Prints in rolls are developed in a regular Morse developing outfit.

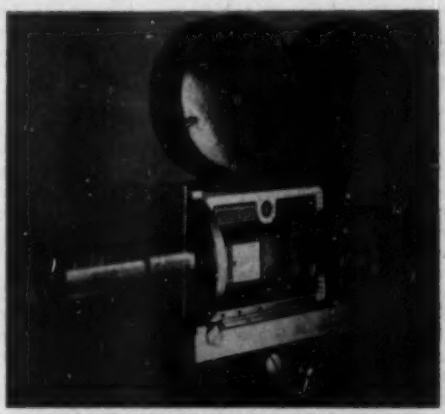

Fig. 2. Modified Mitchell 35mm Motion Picture Camera with Polaroid f/0.7 lens, 50mm focal length for television recording. Official Photograph U. S. Navy.

For records of combat action a new 70 millimeter hand-held camera (Fig. 1) has been developed. Battle records are invaluable for intelligence purposes in assessing the quality of equipment, enemy materiel, effects on personnel, damage, tactics, and for public information purposes. Other Navy developments for reconnaissance include Radar Scope and Television Screen photography (Fig. 2) which will be briefly mentioned under instrumentation photography.

Mapping and Charting Photography

Fully appreciating our global responsibilities for accurate mapping and charting, photography in support of the Navy Hydrographic Office requirements and other mapping agencies, the Navy has fostered the development of the CA-8 Cartographic Camera by Fairchield as a major step in satisfying this requirement. The CA-8 camera was developed precisely to meet the rigorous mapping specifications.

These and other accomplishments illustrate the Navy's persistent effort to develop methods and means for obtaining precision aerial photography. It is not always known in advance just what final use may be made of photographs taken for an immediate specific purpose, such as combat reconnaissance. Therefore, it is highly desirable to have the photography as precise as possible and related data detailed and complete in order to meet requirements which may later develop for the photography.

Recently the Naval Air Experimental Station at Philadelphia was directed by the Bureau of Aeronautics to develop the Aircraft Landing-Sinking-Speed Camera. Results thus far have been extremely promising. The landing sinking speed of Navy aircraft landing on a carrier is much greater or steeper than required for land-based aircraft. With the landing-sinking-speed camera the sinking speed of the aircraft is measured. The camera provides a vital tool for the Air Officer on board a "flattop" to obtain accurate records of exactly how hard any particular aircraft lands. Thus, it will be possible for him to quickly determine whether to re-spot a suspect aircraft for the next strike or send it below for a thorough structural inspection. It is obvious that this camera will not only help to prevent the crashing of vitally needed planes but, more important, will save the lives of vitally needed pilots.

Instrument Recording and Technical Applications

As the field of instrumentation recording broadens, photography becomes an increasingly depended-upon tool in scores of scientific and military research problems. Starting from the early days of World War II, the Navy has made substantial progress using photography in this expanding field. An early application involved an investigation to learn how cathode-ray tube motion picture photographs could be obtained. Successful photography under actual operating conditions was obtained and was used in Navy training films for training new radar operators. The field of radar and television screen photography has long intrigued photographers and by now this field has few limitations.

Recently the Navy revealed a development wherein a television or radar scope can be photographed on 35 millimeter film and viewed directly through the film, or, in the form of 8" x 10" paper enlargements, within several minutes. The recording and viewing process is continuous,

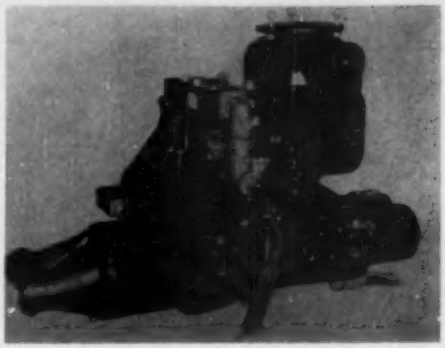

Fig. 3. Type "A" Airborne 35mm Radar Recording Camera providing continuous viewing simultaneous with photographic recording. Official Photograph U. S. Navy.

thus providing a strip record of subjects previously seen on the scope. An outstanding Navy sponsored development has been the Airborne Radar Recording Camera, Type "A", built by Fairchild, which has a capacity load of 100 feet of 35 millimeter film. This camera (Fig. 3) with some small modifications is the standard airborne radar recording camera used by U. S. Forces today.

The Navy has greatly expedited its research, development and testing of many items of ordnance by the use of instrumentation photography to determine such things as deformation, yaw and the velocity of detonation. The special adaptations of X-Ray photography to determine imperfections, correct assembly, arming characteristics and deformation of recovered samples are becoming increasingly useful.

In the development of guided missiles alone, technical photography has contributed handsomely. Outside of telemetered information, most of the essential data accumulated by the missile during its flight is external triangulation photography and internal instrumentation recording. The Navy recently developed special photogrammetric techniques which can be applied to the K-25, 4"x5" photographs, tripped automatically from a V-2 missile during flight, to accurately determine the missile's exterior orientation, that is, bearing of the long axis, elevation on that bearing, and rotation on that axis.

In addition to taking photographs from missiles, the Navy has developed photographic systems for taking pictures of the missiles themselves in flight.

An outstanding contribution in this field is the Bowen Acceleration Camera. This camera was recently re-designed by Naval ordnance experts and the improved version manufactured by the Aeronautical Photographic Experimental Laboratory. The Modified Bowen Camera accurately measures the acceleration of missiles.

Progress of the Navy's missile program depends heavily upon photography to secure detailed information on missile launching, burning, separation of booster from missile and other items of flight performance data. Some of the cameras used are of conventional type with minor modification but others have been designed and built especially to photograph rocket and guided-missile flights. These include cine-

theodolites, ribbon-frame cameras, tracking motion-picture cameras, and fixed, still or motion-picture cameras. It is generally agreed that the developments in photographic instrumentation, whether for picturing missiles in flight, recording transmitted data obtained by electronic tubes, or photographing dials, scales and counters, instrumentation photography is a most essential tool to the missile program. It provides a means of obtaining data which can be checked against information recorded by other means to confirm accuracy of measurement and to provide a safety factor in case of failure of other systems in expensive field tests.

The Bureau of ships is successfully applying high speed photography to its research program on shock. Personnel have been protected and ships made safer through the results of tests showing the behavior of equipment and its components at the instant of shock impact. Such photo records have accurately described the magnitude of displacements and indicated the reasons for failure of equipment caused by sudden shock or prolonged vibration.

Naval Medicine is pioneering new types of still and motion picture photography in color. New surgical techniques and medical procedures are becoming permanent records for posterity and for instructional purposes in the Navy and in medical schools and institutions outside the service. Crash-impact movies taken at thousands of frames per second, in color, have substantially aided in the development of such things as a more practical safety harness for aviators. Color photography is particularly useful because by its use muscle conformation, skin reaction and blood distribution can be more readily observed on volunteer research personnel at the moment of crash impact.

In the field of Photographic Materiel, Navy sponsored research and developments are widely ranged and considered as a fundamental part of the whole Navy photographic program. It is no less important that operational or research personnel have excellent quality film and paper, laboratory processing and testing equipment, and efficient techniques and procedures to insure high quality results than it is to have a fine camera or a high-performance photographic aircraft.

Photographic Material Specifications

In addition to photographic hardware, the Navy is continually developing acceptable procurement specifications and standards for objects ranging from 70 millimeter spools to photo-aircraft configurations. An example of recent noteworthy development of photographic materiel is the Navy Electronic Shutter Analyzer Model 950 built by the Triumph Manufacturing Company of Chicago, Illinois. This analyzer has proven itself to be an excellent instrument capable of furnishing answers to an exceptionally wide variety of photographic problems and a most welcome addition not only to the Naval service but the photographic industry as well. Developments related to photographic materiel such as these, are implemented by the Bureau of Aeronautics through the U. S. Naval Photographic Center or the Aeronautic Photo Experimental Laboratory. (Fig. 4.)

To serve the needs of the map maker, intelligence officer, operational photographer, or researcher, the Navy has developed new photogrammetric methods and procedures to meet requirements ranging from determination of precise camera calibrations in laboratory or field, to an evaluation of test aircraft performance or assessment of the accuracy of anti-submarine-warfare attacks at sea. The separate categories of research involving all the applications of photogrammetry are again too numerous for mention in this paper.

Training Films

Finally, in the field of Educational Photography—including Training Films, the Navy continues to make substantial progress. Since 1942 the Bureau of Aeronautics has made approximately 5500 training films ranging from such subjects as "Deep Water Diving" to the "Operation of Electronic Equipment in Aircraft". Although training films appear as an unheralded by-product of photography in research, in testing and in operations, few can deny the important role such films play in rapidly extending the experience of thousands of military and civilian personnel in a short period of time—an invaluable military asset in time of war.

The Navy has a primary concern for the development of its personnel as well as its materiel, in getting efficient results. To paraphrase an old saying in the Navy, if a choice be necessary, "give us good men on poor ships rather than poor men on good ships." In Naval photography this spirit is reflected by the actions and capabilities of sailor and marine photographers throughout the world. The same spirit exists among vital civilian personnel employed at the Naval Photographic Center, where training films are made, at the specialized Photographic Interpretation Center, in the Aeronautical Photographic Experimental Laboratory, and in the many Naval research laboratories.

Combined with the steady development of photographic equipment and material by American industry, the cooperation within our military services and the continued contributions of personnel in and out of the service and ideas by technical groups, such as the Photographic Society of America, Naval Photography will continue to make progress and advance for the maximum benefit and defense of our country.

Fig. 4. Camera installation for testing special lenses. Official Photograph U. S. Navy.

INFRARED CONTACT PHOTOGRAPHY OF DOCUMENTS

JOSEPH THOLL*

THE CONTACT method of infrared photography provides a highly selective and penetrating medium for the examination of questioned documents. The infrared transmittance properties of paper coupled with the various transmittance and absorption characteristics of inks, stains, markings, etc., renders this technique an effective means for the detection and demonstration of several classes of evidence. Infrared contact photography has comparatively simple equipment requirements and is rapid and efficient.

The technical procedures for making infrared contact photographs are sometimes off the beaten path because of unusual and special considerations. Every document problem has its own specific photo-chemical peculiarities which must be recognized and dealt with accordingly. Folded documents enclosed in light-opaque envelopes, for example, require an extended exposure of the photographic film with an extremely short development. The filtering out of ink smears and stains, on the other hand, takes a relatively short exposure with a full development. Other considerations are: the proper degree of filtering to be employed, the color of the backing placed behind the film during exposure, the thickness of the subject, the behavior and limitations of the photographic emulsion.

Applications

The contact method of infrared photography has been successfully applied to a variety of disputed document problems which includes: (1) The photography of written and printed matter on folded documents sealed in light-opaque envelopes. (2) The examination of lined envelopes which are presumed to have been forced open. (3) The differentiation of confusingly similar dark inks and markings. (4) The detection of suspected additions and alterations in the case of ink writing. (5) The decipherment of matter obliterated with ink, dirt, oil, etc. (6) The filtering out of ink smears, blots, discolorations and stains. (7) The decipherment, in some cases, of illegible watermarks on charred paper.

Exposure, Development, and Lighting

In visible light photography, considerably longer exposure is required for shadow detail than for highlight detail. Similarly, a more extended exposure is necessary to record the relatively weaker transmission of infrared through several thicknesses of paper than would be required for the differentiation of inks on a single sheet. Insufficient exposure of infrared transmitted by a thick obstruction can be compared to insufficient exposure of an ordinary photograph for shadow detail. The shorter exposures for freely transmitting substances can be compared to those used for highlight detail. In the case of infrared contact photographs, the abnormally long exposures require short developments to keep down contrast

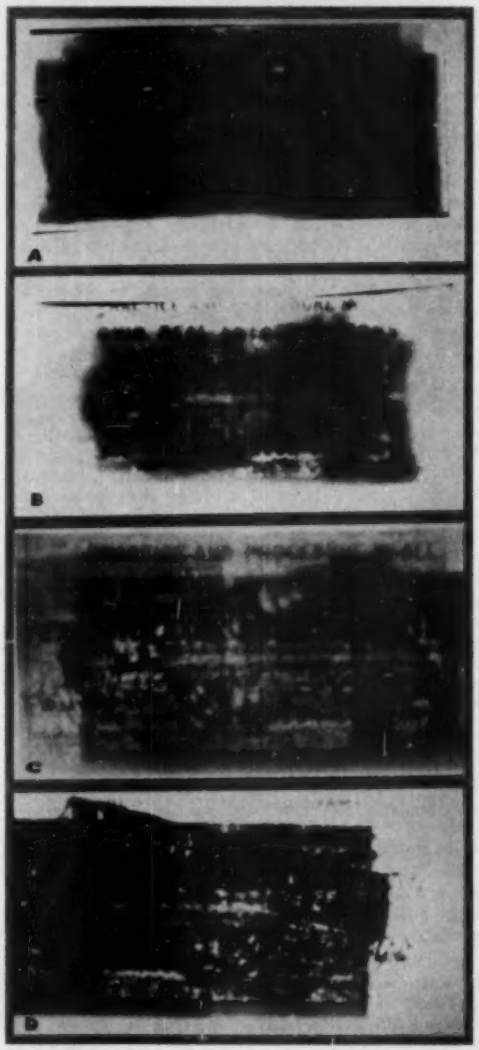

Fig. 1. Camera and contact infrared photographs of printed matter (six thicknesses) enclosed in a sealed envelope. A. Underexposed camera photograph. B. Well exposed camera photograph. C. Contact exposure. (Note the outlines of two gelatin infrared filters between the film and the envelope). D. Contrast exposure from the opposite side. Printed matter on the folds closest to the film registers more clearly.

* Examiner of Questioned Documents, 3260 Cedarbrook Road, Cleveland 18, Ohio. Received 7 December 1950.

Fig. 2. Contact photograph on orthochromatic film by visible light of typewritten document enclosed in an envelope, both being capable of transmitting visible light. Documents bearing messages that are transparent to infrared sometimes may be photographed by this means.

and density whereas the shorter exposures need a normal development because of inherent flat gradation. The Photoflood lamp, which is a rich source of infrared radiations, is well suited for the long, penetrating exposures while a 10 or 25 watt tungsten lamp is more practicable for the short exposures.

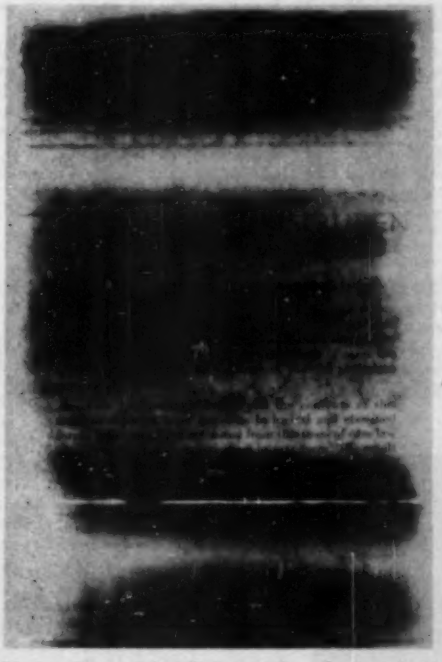

Fig. 3. Contact infrared photograph made through 64 page periodical. The white line was made by the hinge opening on the back of the printing frame.

Photographing Through Thick, Light-Opaque Obstructions

A folded document sealed in a light-opaque envelope was used in Fig. 1 to illustrate both contact and camera copying techniques with this class of subject. The enclosure, a printed circular on white, calendered paper, was folded three times to give six thicknesses.

The envelope with its enclosure was placed over a light box and masked so that no visible radiations filtered through the sides. The light source was a No. 1 Photoflood lamp. The lens, a 127mm Ektar, was screened by a Wratten No. 87 filter and stopped down to f/5.6. The photographs were made in a completely darkened room so that only the transmitted infrared would be utilized.

Fig. 1-A, which was exposed for thirty seconds, shows penetration only in the less opaque portions whereas Fig. 1-B, which received a three minute exposure, reveals more penetration but still lacks detail and definition. A smaller aperture would have improved the results somewhat but would have necessitated a long, hazardous exposure. Fig. 1-C, made by contact using a twenty second exposure at a distance of twelve inches from a No. 2 Photoflood, shows a more substantial transmission of infrared radiations.

Fig. 1 demonstrates three progressive stages of infrared recording. The longer the exposure, the greater the absorption of infrared (within the limitations of the emulsion) and the more legible the sealed, folded contents.

Another contact photograph, Fig. 1-D, was made to bring out the printed matter on the other side of the enclosure. Subjects of this type should be photographed from both sides since it is evident that the matter closest to the emulsion registers most quickly and clearly. The development in all cases was for two and one-half minutes (about one-third normal) in formula D-61a.

Use of infrared film is not always necessary for the photography of sealed contents in envelopes. Wherever there is any transmission of visible light through an enclosure or a thick document, ordinary film will give an excellent negative. (Fig. 2).

It is apparent from Fig. 1 that the greater the exposure by transmitted infrared radiation, the more the penetration and the greater the degree of transparency. This fact is borne out even more by the following experiment.

Inasmuch as transmitted infrared radiations were readily passed through at least eight thicknesses of paper, another more extreme experiment was performed. A 5x7 sheet of infrared film was placed in contact with a periodical of sixty-four pages (*Case and Comment*) plus the thickness of the two outer covers. The subject, which could barely be squeezed into a printing frame, was exposed for three minutes at a distance of six inches from a No. 2 Photoflood. The exposed film was developed for two and one-half minutes in D-61a to avoid prohibitive density and contrast. Figure 3 demonstrates the transmission of infrared radiations through a substance of practicable thickness to give a photographic image of printed matter on those portions closest to the film. Increased exposure, here, would have given more detail.

Lined envelopes are quickly penetrated by transmitted infrared radiations. Fig. 4 is an infrared contact photograph of a folded Kodak data circular inside a lined envelope. Since the blue lining was quite transparent to the infrared, a five second exposure was sufficient to penetrate the entire

subject. The white patches on the flap indicate a forced opening in which sections of the lining were torn. The black area is a strip of masking tape on the farthest side of the envelope.

Deciphering Illegible Matter

Transmitted infrared radiations in many instances provide a greater degree of selectivity than is possible by direct (reflected) lighting methods. Permanent-type inks can therefore be rendered more transparent by the contact method than by the use of infrared film in a camera. Hence iron-rich inks and other similar substances which are relatively opaque to infrared can, through the exclusive use of transmitted infrared, be more effectively filtered out to better reveal erased and obliterated matter. (Fig. 5).

Figure 6 shows a contact photograph made from ortho film of a section of mimeographed typewriting erased with a black washable ink. On the right is an infrared contact photograph of the same subject exposed through Wratten Nos. 87 and 88A gelatin filters. The admixture of visible transmitted light in the unfiltered portion (between the filters) results in a limited filtering action-here, the ink and paper have together acted as a kind of filter. Also, it is evident that the more opaque Wratten No. 87 on the left has a more decided filtering action than the Wratten

Fig. 4. Infrared contact photograph of printed matter enclosed in a lined envelope. White areas on the flap indicate forced opening of the envelope before resealing.

No. 88A on the right. The exposure was one-fifth of a second at a distance of 12 inches from a 25 watt lamp. A 2 minute development in D-72 was used to overcome inherent flatness.

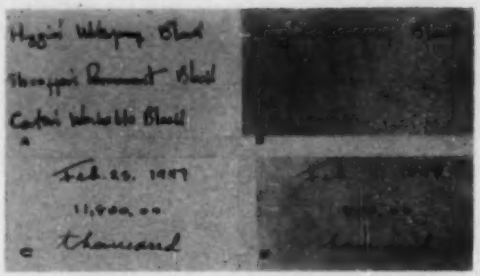

Fig. 7. Differentiation of inks, often useful in revealing forgeries. (A) Three types of black ink photographed by a camera. (B) Infrared contact photograph of the same copy. The carbon ink is opaque to the radiation and the washable ink is completely transparent. (C) Camera photograph on panchromatic film of suspected forgery written with black ink. (D) Infrared contact photograph shows where the alterations were made.

The Differentiation of Inks

Infrared contact photographs can be used for the differentiation of inks where the proper degree of filtering is employed. Extreme filtering (as with Wratten Nos. 87 and 87C) renders most inks practically transparent whereas moderate filtering allows various inks to be separately distinguished (Fig. 7). Sometimes the ink itself is the most effective filter.

In a disputed note matter, infrared contact photography revealed subsequent alterations and additions in a different ink. Both the original writing and altered portions had been made with black ink. Since the original ink was a carbon type and the ink used in making the changes a washable type, an infrared contact photograph (Fig. 7 easily showed how the note was altered. A Wratten No. 87 filter was used.

Decipherment of Charred Watermark

Transmitted infrared radiations have been used to bring out an illegible watermark on a section of charred document. The compressed fibres of the watermark proved to be more opaque to infrared than the surrounding charred area. A three minute exposure to a No. 2 Photoflood and a three minute development in D-61a was used.

Fig. 5. Penetration of iron-rich ink, opaque to light and relatively opaque to infrared. A camera photograph on the left on panchromatic film. Infrared contact photograph (from the opposite side of the copy) on the right.

Fig. 6. Penetration of washable-type black ink by infrared. The contact photograph (left) was made on orthochromatic film. The infrared contact photograph (right) was masked by Wratten 87 and 88A filters.

Filtering

Many degrees of filtering are possible with infrared contact photographs depending on:

1) The amount of visible light transmitted.
2) The wave-length region transmitted in the infrared.
3) The filtering characteristics of the ink (and similar substances) and the paper.

Where a document is light-opaque, the paper itself serves as an effective infrared filter (Figs. 1C, 3, and 4). The more visible light admixed with the infrared the less marked the infrared filtering action (Fig. 6).

It may be observed in Figs. 1C and 6 that the use of an infrared filter over the subject resulted in better definition and contrast. In both cases the unfiltered areas between the filters can be compared with the filtered areas.

The Use of Backings

The color of backing placed behind the infrared film during the exposure affects the degree of sharpness and contrast obtained. Halation effects are minimized by dark-colored backings. Figures 1C and 1D utilized the red felt back of the printing frame. Even better results can be obtained by the use of black paper backing such as the interleaving papers in which films are packed.

Applications in Other Fields

The contact method of infrared photography can be utilized in other fields such as criminology, philately, botany, and others. Where thickness or irregularity renders contact photography impractical, the camera can be used in conjunction with a series of flash exposures. Here, too, the photographs must be taken in total darkness utilizing only the transmitted infrared.

REPLENISHMENT OF THE FILM STOP BATH*

R. W. Henn, APSA, and J. I. Crabtree, FPSA

SUMMARY

Replenishment of an acetic acid film stop bath has been investigated by (1) titrations and calculations, (2) laboratory exhaustion tests, and (3) trade tests. Replenishment with acetic acid was successful in maintaining suitable pH levels and neutralization times, while the carry-over of salts from the developer maintained the anti-swelling action. Good agreement was obtained between calculations, chemical tests and practical exhaustion tests, although differences were noted in the trade tests within the limits of tolerance set. The process of replenishment appears economical, and further savings could be effected by reducing the replenishment rate in some instances, particularly if suitable indicators are employed. Replenishment recommendations for Kodak SB-5a are made on the basis of 0.3 gallon of glacial acetic acid per thousand (80 sq-in.) rolls of film and a replenishment interval of 100 rolls per gallon.

To DATE the acid stop bath has received much less attention than the developer and the fixing bath, yet its role is extremely important. It serves to (1) neutralize developer chemicals, preventing the continuation of development and the formation of streaks and dichroic fog, (2) remove calcium scums from the film which may have formed in the developer, and (3) deliver the film into the fixer in an acid condition, thus preserving the acidity and hardening properties of that bath and preventing the formation of alum scums and sludges.

In spite of these valuable functions of a correctly compounded and maintained stop bath, a bath which has been incorrectly mixed or maintained may introduce difficulties in itself. If it is insufficiently acid, it may form a source of dichroic fog and oxidation stain, while a bath of extreme acidity and low salt content may cause the film to swell and possibly introduce frilling, reticulation, and blisters.

The correct maintenance of the stop bath to serve these functions and not introduce added difficulties is the subject of these investigations, but only the film stop bath, particularly as applied to photofinishing, is dealt with in this paper.

The formula, Kodak SB-5a, was chosen as the most suitable bath for photofinishing, since its capacity is sufficient to permit of considerable use between replenishments. As indicated in Section D, this bath contains 2% acetic acid and 4.5% sodium sulfate, the acid serving to neutralize the developer and the sodium sulfate to prevent excessive swelling of the film.

The developer chosen for this investigation was Kodak

* Delivered at the PSA Convention, Baltimore, Maryland, 20 October 1950. Received 17 October 1950. Communication No. 1369 from the Kodak Research Laboratories.

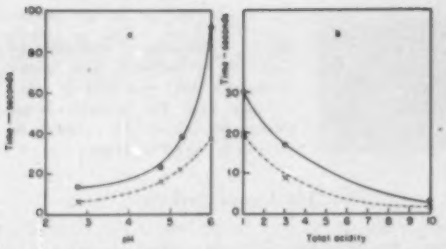

Fig. 1. Neutralization Time vs. Acidity. Illustrates the function of the two types of acidity, (a) degree of acidity (pH) and (b) total acidity, as affecting the neutralization time. In Figure (a) a 1.3% solution of acetic acid has been adjusted to the pH level indicated, dyed film immersed in the bath, and the time to penetrate (neutralize) noted. The most acid bath has the lowest pH value and neutralizes the most rapidly. In Figure (b), the pH has been kept constant at 4.8, but the total acidity has been varied by adding increasing quantities of acetic acid and sodium acetate. It is seen that the higher the total acidity, the more rapid is the action of the bath. Dotted lines show the influence of agitation; note how greatly this reduces the neutralization time.

Durol 7, which is a negative developer extensively employed in photofinishing. The total alkalinity (which is the combined neutralizing action of the sulfite and alkali) of Durol 7 does not differ greatly from that of Kodak Durol 10 or Kodak DK-60a, especially when replenished, and most of the data obtained may be applied to these developers, also. The general principles of stop-bath replenishment evolved may, of course, be applied to any acetic acid stop bath-developer combination.

A. Desirable Acidity of the Stop Bath

1. *Neutralization Time*

The stop bath should neutralize the developer rapidly and efficiently. The speed of neutralization is dependent on (a) the nature and thickness of the emulsion, (b) the degree of acidity or pH, (c) the total acidity, and (d) the degree of turbulence. These factors have been studied by immersing films or paper in a developer containing an indicator dye, then transferring them to the stop bath and noting the time required to neutralize the absorbed developer and dye.

Table I reproduces data showing the times of neutralization of various films and papers dyed by processing them in a developer containing bromcresol purple and then placing them in Kodak SB-5. It will be noted that the time of neutralization varied with the emulsion, the thicker the emulsions, the longer the time required for neutralization.

The effect of the pH of the stop bath on the rate of neutralization was investigated with Velox paper bathed in Dektol containing phenolphthalein. These results are plotted in Figure 1a. As might be anticipated, the more acid the bath, the more rapid is the neutralization. The neutralization time was doubled as the pH was raised from 3 to 5 and became very long at a pH of 6. It is obvious, therefore, that an acid stop bath is useless long before it is completely neutralized at a pH of 7.0.

The same procedure was used to investigate the effect

Table I

NEUTRALIZATION TIME IN KODAK SB-5

Emulsion	Unagitated	Agitated
Positive Film	75 seconds	30 seconds
Panchro-Press, Sports Type Film	75 seconds	25 seconds
Panatomic-X Miniature Film	105 seconds	35 seconds
Blue Brand X-ray Film	60 seconds	30 seconds
Kodabromide Paper	35 seconds	20 seconds
Velox Paper	30 seconds	20 seconds

of total acidity. "Total" acidity differs from the *degree* of acidity or pH value in being a function of the reserve acidity, and in a buffered system, widely different quantities of reserve acidity may be present at the same pH value. An analogy may perhaps be reached by comparing two cars of widely differing horsepower which are moving at the same rate along a level road; when they reach a steep hill, the greater reserve power of the car with the higher horsepower will be noted.

In Figure 1b, the pH of all baths was held constant at about 4.7-4.8, while the total acidity was adjusted by using varying quantities of a mixture of sodium acetate and acetic acid. It will be seen that the neutralization time decreased rapidly with increase in acetate content (total acidity), the time in a 10% solution being only about one tenth that in a 1% solution. The important effect of agitation (degree of turbulence) is seen from the curves in Figure 1, which show that even a moderate degree of agitation may reduce the time of neutralization by 50%.

Imperfect or slow neutralization of the developer results in mottle and streaks, as shown in Fig. 8. This nonuniformity will be minimized when the stop bath is sufficiently acid and the film is thoroughly agitated, as mentioned.

Developers of low activity obviously will give less streakiness and mottle than more active ones, and thorough and rapid draining after development will insure that if development does continue in either the stop bath or the fixing bath, it will proceed more uniformly.

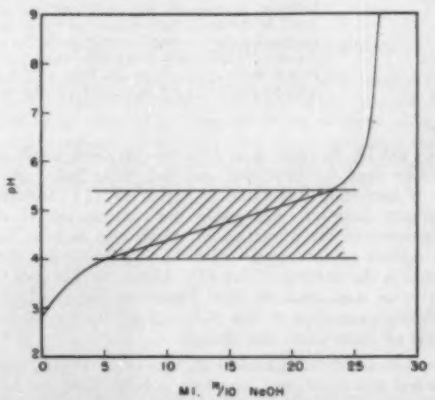

Fig. 2. Neutralization Curve of Acetic Acid with Sodium Hydroxide. The buffer range is shown by the shaded area. In this range a considerable quantity of the alkali may be added without greatly changing the acidity (pH). Data are for a 25-ml sample of 0.6% acetic acid neutralized by 0.10*N* sodium hydroxide.

The incorporation of a wetting agent in the developer insured more rapid draining during transfer to the stop bath, while incorporation of a wetting agent in the stop bath, in some cases, tended to reduce somewhat the time of neutralization.

2. *Effect of Stop Bath on the Fixing Bath*

Unless the developer carried over by the film has been fully neutralized by an appropriate stop bath, during use the acidity of the fixer will gradually decrease. It is especially important to prevent this loss of acidity in the case of Kodak Rapid Liquid Fixer, and other ammonium hypo baths, because during the long exhaustion-replenishment life the tendency to produce dichroic fog or stain, and the loss of hardening, would be serious. In order to maintain adequate hardening, the pH of the fixer should be maintained below pH 5, and this value will also prevent dichroic stain. This requires that the average pH value of the stop bath should also be below 5.

3. *Odors and Blistering*

The requirements of the fixing bath set the desirable upper limit for the pH value at not greatly beyond 5. The lower limits are probably most rigidly fixed by the odor, since the sulfite carried into the acid stop bath by the developer tends to evolve sulfur dioxide gas. When the pH of the bath is materially below 4, the odor of sulfur dioxide may become very strong and cause discomfort. A strongly acid bath will also be most likely to swell the film, but a pH as low as 3, which is the starting acidity of Kodak SB-5a, is not objectionable in the presence of adequate salt concentration, such as 5% sodium sulfate, which SB-5a contains.

4. *Usable Acidity*

A neutralization curve for acetic acid is reproduced in Figure 2. This curve shows that approximately one fifth of the total acidity lies below a pH of 4 and another one fifth above a pH of 5, the remaining three fifths being neutralized in the pH range of 4 to 5. Starting with a fresh bath, 80% of the acetic acid will have been neutralized by the time the pH reaches 5, while if the replenished bath is maintained between 4 and 5, about 75% of the acetic acid will be used up with each neutralization.

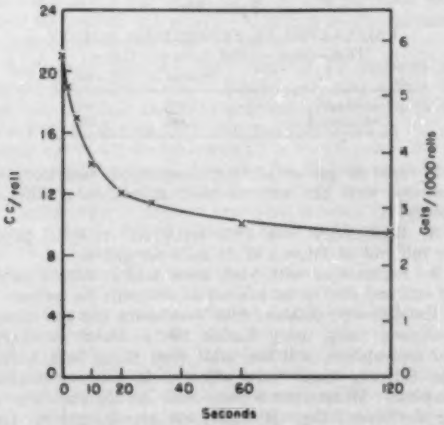

Fig. 3. Carry-Out vs. Draining Time. Determined with 80 sq-in. rolls of Verichrome Film and Kodak Durol 7 at 68 F. The surface developer drains rapidly at first, but later only slowly. A minimum draining time of 10 seconds should be observed to insure a minimum of carry-over and therefore preserve the acidity of the stop bath.

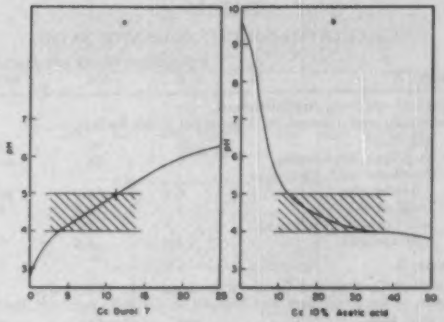

Fig. 4. Neutralization Curves of (a) SB-5a with Durol 7, and (b) Durol 7 with Acetic Acid. Curve (a) was obtained by making increasing additions of Durol 7 to a 25-cc sample of SB-5a. Note that after 11 cc the pH has risen to 5 and the bath should be replenished. This represents the developer carried over by 100 to 150 rolls of film per gallon of stop bath. Curve (b) is useful in determining the quantity of acid needed to restore the bath. This was obtained by titrating a 25-cc sample of Durol 7 with 10% acetic acid. An equal volume (25 cc) of 10% acetic acid has been adequate to neutralize the developer and restore the pH to the lower part of the working range (shaded area).

5. *Desirable pH Value of Stop Bath*

It would appear desirable, therefore, from the examination just given to maintain the pH value of the replenished stop bath in the range of 4 to 5. This is higher than that of the fresh bath, which has a pH of about 3, but it can be made to neutralize just as actively, as shown by Figure 1b, if the total acidity, that is, the reserve acid strength, is doubled.

B. Laboratory Determinations and Calculations

1. *Quantity of Developer Carried Over*

Before selecting the replenishment interval and quantity of acid needed to neutralize the developer, it is necessary to inquire into the quantity of developer carried over by the film. This carried-over developer will be (1) that absorbed by the emulsion, and (2) that adhering to the surface of the film. The quantity of absorbed developer will vary with the emulsion, temperature, and nature of the developer, while that on the surface of the film will decrease with the time of draining. Figure 3 shows the carry-over obtained with Verichrome film processed in Durol 7 developer at 68 F with varying time of draining. It will be seen that the surface developer drained rapidly during the initial period, and that the carry-out when the draining time exceeded 15 seconds was little in excess of the absorbed developer, or about 11 cubic centimeters (⅜ oz) per 80 sq-in. roll or 3 gallons per 1000 rolls. This value

Table II

CALCULATED CONDITION OF STOP BATH

System A	Exhaustion (Rolls per Gallon) 0	200	800
(Rates of carry-in, Replenishment, Carry-out, and Discard = 3 gals. per 1000 Rolls)			
% Stop Bath	100	39	2
% Stop Bath Replenisher	0	30	49
% Developer and Developer Replenisher	0	31	49
% Total Acidity	2	3.8	5
% Salt Content (exclusive of acetate)	4.5	4.6	5
System B			
(Rates of Carry-in and Carry-out = 3 gals. per 1000 Rolls; Rates of Replenishment and Discard = 0.5 gals. per 1000 Rolls)			
% Stop Bath	100	54	9
% Stop Bath Replenisher	0	6	13
% Developer and Developer Replenisher	0	40	78
% Total Acidity	2	4.3	7.5
% Salt Content	4.5	5.5	8

has been confirmed by a number of trade tests using Pako film-processing machines and is accurate to ± ¼ gallon per 1000 rolls. The presence of a wetting agent in the developer did not materially change this value.

2. *Acid-Developer Equivalences*

A stop bath maintained in the pH range of 4 to 5 has been shown to be suitable for photofinishing, while the typical carry-over as described here is about 11 cc per roll or 3 gallons per 1000 rolls. Now, if it can be determined how the developer and stop bath neutralize each other, the chemical basis for replenishment will be established. The titration curves of Figure 4 illustrate this neutralization, from which it is seen (Fig. 4a) that the addition of 11 cc of Durol 7 to 25 cc of SB-5a raised the pH to 5. This would be the quantity of developer carried in during an exhaustion of about 150 rolls per gallon, but when compensation is made for the unneutralized stop bath carried out and the more alkaline developer replenisher employed, a figure of 100 rolls per gallon appears safe as the maximum interval between replenishments.

The quantity of acetic acid needed for replenishment is shown in Figure 4b. It will be seen that to lower the pH below 4 requires a large quantity of acid, but that 25 cc of the 10% acid has fully neutralized the 25 cc of Durol and restored the pH to the lower part of the working range (4.1-4.2). It would appear practical, therefore, to maintain the acidity of the bath by adding a volume of 10% acetic acid equal to the volume of developer carried in, or about 3 gallons per 1000 rolls. A smaller quantity of stronger acid would also perform the same function, and it is interesting to compare the results obtained with these alternate schemes.

3. *Calculation of Condition of Baths*

Where the carry-over and replenishment rates are known, it is possible to calculate the condition of the stop bath using the equations of Herzberger and Henn (PSA Journal 13: 494-497, August 1947). In Table II the results of replenishing with a larger volume of dilute acid (10% acetic acid at 3 gallons per 1000 rolls) or a smaller volume of a stronger acid (56% acid at 0.5 gallon per 1000 rolls)

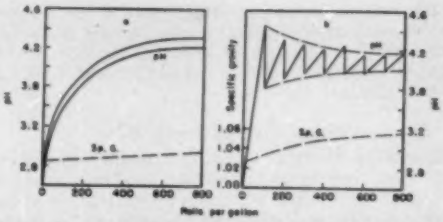

Fig. 5. Laboratory Exhaustions. In Curve (a), Stop Bath SB-5a was replenished frequently with 10% acetic acid, while in Curve (b) replenishment was less frequent, and 56% acid was used. pH values obtained before and after replenishment are plotted. The specific gravity is a measure of the salt content, and consequently of the anti-swelling action of the bath.

are compared. In the first place, the bath is largely replaced by a mixture of equal volumes of developer and stop bath replenisher and, as determined by the above titrations, should be in the desired pH range. In the second case, the volume of stop bath discarded is less because of the lower replenishment rate, and while the percent of replenisher used is less, the total acidity is actually higher.

The sodium sulfate of the original bath need not be replaced since its anti-swelling action is fully compensated for by the salts carried in from the developer.

C. Exhaustions and Trade Tests

When considering the alternate replenishment schemes of (a) fairly weak acid added frequently, as with developer replenishment, and (b) stronger acid, added at less frequent intervals, as with fixer replenishment, it becomes apparent that the first scheme has the advantage of smaller fluctuations and fewer waste products, while the second system is more convenient and yields a bath which is high both in total acidity and in salt content.

Table III

CALCULATED VS. DETERMINED ACIDITY
(Exhaustion = 800 Rolls per Gallon)

	System A	System B
Calculated	5.0%	7.5%
Determined	4.8%	8.0%

In order to get an accurate comparison, laboratory exhaustions were run with the two replenishment schemes, namely:

A. Replenished with 10% acetic acid at 0.003 gallon per roll and an interval of 25 rolls per gallon.

B. Replenished with 56% acetic acid at 0.0005 gallon per roll and after at an interval of 100 rolls per gallon.

The data were obtained with Verichrome film and normal processing times using Kodak SB-5a, Durol developers and replenishers, and the usual dual fixing bath system. The draining times were adjusted for normal machine carry-over. Measurements were made of the condition of the developer; the pH value, the specific gravity (salt content), the total acidity of the stop bath, and of the condition of the fixer. Since the other data are not entirely pertinent here, the discussion will be confined to the stop bath, but both the developer and fixer remained in excellent condition.

Figure 5 presents data obtained in these exhaustions. It is seen that, as predicted, the fluctuations in scheme (a) are less than those of scheme (b) but even with the less frequent additions, the pH fluctuations are not great after the first replenishment, and decrease continually as the total acidity builds up. The increase in specific gravity represents a doubling of the salt content which gives added anti-swelling margin. The total acidity, as determined by the buffering capacity, in the range of 4 to 5 increased markedly, and combined with the pH values below 4.5 would result in rapid neutralization of the film (see also Figure 7).

It is interesting to compare the total acidity found with that calculated in Section B, and this is done in Table III. The agreement may be considered good, in view of the cumulative errors of replenishment introduced, especially where the volumes are small.

Trade Tests

The laboratory tests have shown that about 1 volume of glacial acid should be added per 10 volumes of developer carried into the bath, and that satisfactory results may be obtained when this quantity of acid is added, in as dilute a solution as 10%, provided a proportionally greater quantity is employed. However, the use of a more concentrated acid is usually more convenient and tends to build up a higher total acidity. The photofinishers with whom the procedure was placed for testing preferred to use glacial acetic acid and to replenish at the same time as the fixer. Thus, when employing a Pako Senior film-developing machine with a 48-gal. stop-bath tank, 1.5 gallons of glacial acetic acid were added after each 5000 rolls, and the bath was replaced after 35,000 rolls.

In addition to trade tests run with the Pako Sr. film machine, tests were run with the Pako Jr. machine, with a Williams machine, with the new Pako Tankset, and by a finisher doing hand processing. In each case, replenishment was at 0.3 gal. of glacial acetic acid per 1000 rolls, while the interval was adjusted according to the equipment used to be about 100 rolls per gallon.

The results obtained from three of the finishers are plotted in Figures 6 and 7. Finisher A, using a Pako Sr. machine, obtained results in excellent agreement with the laboratory exhaustion. The bath was maintained in the pH range of 4 to 4.5 during nearly all of its life, while the increase in total acidity is shown by the decrease in neutralization time. It will be noted that the high total acidity of the replenished bath more than compensated for the rise in pH from the initial value of 2.8 to the working range of 4-4.5. The neutralization time was determined by the technique described in gathering the data for Figure 1.

Finisher B, using the Pako Tankset which employs but a short immersion time and holds a smaller volume of solution, replenished at the more frequent interval of 2500 rolls (67 rolls per gal.). His laboratory-like precision of operation is reflected in the regularity of the resulting pH plot. Finisher C is a separate case which should not be considered as representing the typical results to be obtained by stop bath replenishment, but illustrates, rather, the latitude of the process. It will be noted that the replenishment interval is often one third greater than recommended, while the fluctuations of the plot show inconsistent maintenance. But during most of the exhaustion,

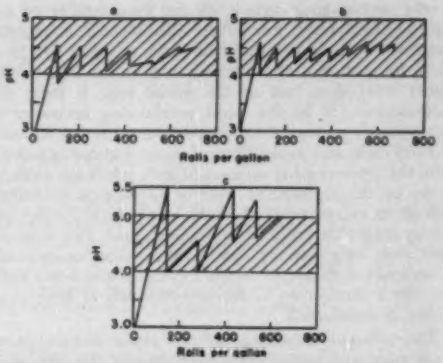

Fig. 6. TRADE EXHAUSTIONS. Plot of pH against rolls per gallon. Results obtained by three finishers shown by Curves a, b, and c. Note differences in regularity of operation. Preferred working range is shaded.

the bath was in the desired range, while it never reached the danger point.

The other finishers employed in this test showed results of varying consistency but, with the exception of one case where an actual error was made in the mixing, all baths kept within very reasonable tolerances.

The physical condition of the baths was generally very good. Where the pH of the bath rose to above 5, a cloudy condition was observed, due to separation of the calcium salts. When the bath was replenished, this condition disappeared. One finisher encountered difficulty with slime growth on the walls of his tank, but this at no time became extensive, and the replenishment procedure extended to include a full summer season without additional difficulty. The odor of the replenished bath was not considered excessive by the darkroom workers, even when they were processing by hand and working intimately with the system.

D. Discussion and Recommendations

The complete group of tests, both laboratory and trade, supplemented by neutralization data and calculations, give

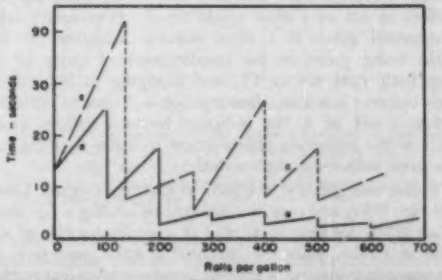

Fig. 7. NEUTRALIZATION TIMES. The baths of two finishers (Curves a and c) of Figure 5 have here been examined for activity in neutralizing the dyed developer in films. Decrease in neutralizing time of replenished baths is due to increase in total acidity. Note that with Finisher C (Curve c) at 150 rolls per gallon neutralization time is excessive, which may cause staining.

a very encouraging picture of the practicability of stop bath replenishment. Excessive replenishment is relatively harmless in that it is difficult to attain very low pH levels, while the fact that the working pH of the bath is at a higher level than that of the initial bath is more than compensated for by the rapid neutralizing action of the accumulated acidity. Considerable tolerance is allowable in carry-over and replenishment rates without wandering from the preferred pH range of 4 to 5, while the buffering action of the replenished bath is so great as to make it difficult to exceed a pH of about 6, at which staining propensity might be expected to become acute. The replenishment over long periods allows considerable accumulation of neutralized developer in both the stop and fixing baths, but this accumulation is not objectionable as long as the acidity is maintained.

The economic advantage of this replenishment process is not great with regard to chemical savings. Actually, somewhat more acid is used in replenishing the bath after processing 100 rolls per gallon than would have been required to compound a fresh bath, but the savings in sodium sulfate compensate for this, while the ease of pouring in 6 quarts of glacial acetic acid is appealing as against the time and production loss involved in dumping and mixing a new 48-gal. tank. The need for more acid to replenish than was employed initially seems strange at first glance, but will be seen on examination of the neutralization curves, the chief reasons being that (1) the full value of the acid is never used up, (2) the low initial pH is never restored, and (3) a considerable margin of safety is allowed.

The necessity for a margin of safety was demonstrated by Finisher C of Figure 6. He used up most of his margin because he was too busy to replenish at the point recommended and because the darkroom workers were careless. Another user who would need most of the margin would be the hand processor who did not drain thoroughly. The careful finisher who closely followed directions might be able to reduce the quantity of acid by one third, but when so doing he should keep a close check on the bath.

Indicator Systems

Kodak Testing Solution A, for stop baths, is designed for paper stop baths and changes at a pH slightly below 6, which is higher than desirable for a film bath, but still suffices to act as a clear guide to an upper safety limit. Bromcresol green is a more suitable indicator for film baths being green in the middle working range of the stop bath (pH 4.5 to 5), and changing to blue as the bath becomes less acid, showing that it is time to replenish. Below a pH of 4, the indicator becomes yellow, and a shift to the yellow or yellow-green indicates that the bath has been sufficiently replenished.

Bromcresol green is available as Eastman Organic Chemical No. 1782, and may be employed by adding a few drops of an 0.5% solution in alcohol to a small quantity of stop bath in a tube. Since the chemical is quite expensive and the procedure somewhat indirect, a more convenient method is to employ an indicator paper impregnated with the dye. A strip of this paper may be placed in the bath and then examined under white light. If it is definitely green, the bath is in the correct working range; if it is definitely blue, the bath should be replenished; if it is yellow, the bath is strongly acid and replenishment should be discontinued. When dipped in the fresh bath, the paper will have a yellow to yellow-orange hue.

Table IV

RECOMMENDED REPLENISHMENT

Equipment	Size Tank	Interval Rolls	Quantity of Acetic Acid 28%	56%	Glacial
Pako Sr.	48 gal.	5000	5.0 gal.	10 qts	6 qts
Pako Jr.	17 gal.	2000	2.0 gal.	4 qts	75 oz
Tankset	33 gal.	2500	2.5 gal.	5 qts	3 qts
Hand Tank	10 gal.	1000	1.0 gal.	2 qts	40 oz
	48 gal.	5000	5.0 gal.	10 qts	6 qts
	48 gal.	2000*	2.0 gal.	4 qts	75 oz
Sheet Film Tank	3½ gal.	350	40 oz	20 oz	14 oz
	1 gal.	100	12 oz	6 oz	4 oz

* Interval reduced to correspond to point of fixing bath replenishment.

In conclusion, recommendations for replenishment of the film stop bath may be summarized as follows:

1. Start with the following Kodak SB-5a formula:

Acetic acid, 28%	64 cc	2 oz	3 gals.
Sodium sulfate (desiccated)	45 gm	1½ oz	18 lbs.
Water to	1000 cc	32 oz	48 gals.

2. Replenish at the rate of 0.1 gallon of glacial acetic acid per gallon of developer carried in. With machine processing or hand processing where the draining time is between 10 and 60 seconds, this will be 0.3 gal. of glacial acetic acid per one thousand (80 sq-in.) rolls, or about 1 cc per film.

3. Replenish not less frequently than every 100 rolls per gallon.

4. Replace with fresh bath after processing 600 to 800 rolls per gallon.

Fig. 8. Illustrates streakiness and mottle which may result from one or more of the following causes: (a) uneven draining of the developer during slow transfer to the stop bath or fixing bath, (b) insufficient agitation when first transferred to the stop bath or fixing bath, and (c) too high a pH value and lack of total acidity of the stop bath, resulting from excessive exhaustion.

FORMATION OF THE LATENT IMAGE BY X-RAYS

E. T. LARSON*

SUMMARY

Qualitatively, there are several points of similarity between the effects of X-rays and visible radiation on silver halide emulsions but quantitative studies show that formation of the latent image by X-rays is less efficient. The relative inefficiency of X-ray exposure is related by latent image theory to the fact that the absorption of one X-ray quantum by a silver halide grain may make available considerably more energy than that required to make the grain developable. High-energy X-rays are considered more efficient than low-energy X-rays because in the former case the energy is more evenly distributed among a number of grains. However, X-rays of quantum energy 200,000 ev are only about 1/3 as efficient as light quanta of energy 3 ev.

The reciprocity law holds for X-ray exposures of emulsions that exhibit reciprocity law failure for light-exposures. X-ray exposures also produce more internal latent image than ordinary light exposures.

The addition of small amounts of complex gold compounds may increase the X-ray sensitivity of an emulsion by as much as ten times; the increase being greatest for high-energy X-rays. Although the mechanism of gold sensitization is not completely understood, it is observed that gold enhances the formation of surface latent image, as opposed to internal image.

THE USE of photographic emulsions to record the effects of X-rays began with the discovery of X-rays by Roentgen in 1895. At that time he reported[1] not only the discovery of X-rays but also the invention of X-ray photography, or radiography, based on his observations that X-rays can penetrate an object which is opaque to visible radiation, and expose a photographic plate behind the object. The resultant radiograph showed the outlines of the object and also, because the transparency to X-rays depends on the thickness and chemical composition, some features of its internal structure.

In the 55 years intervening since Roentgen's discovery, tremendous scientific progress has been made in the field of X-rays. Photographic emulsions are widely used in X-ray diffraction, X-ray spectroscopy, microradiography, radiation monitoring, and other applications, but by far the largest quantity of X-ray film is used today in medical and industrial radiography.

The demand for further improvements in the speed, contrast, and resolving power of radiographic films furnishes the impetus for continued studies[2] of the action of X-rays on photographic films. Work of this nature at the same time contributes to knowledge of the photographic process in general and, therefore, is of importance also to the photographer who is concerned primarily with the use of visible radiation.

Properties of X-ray Films

In discussing the effects of X-rays on photographic films, it is convenient to consider simultaneously the analogous effects of visible radiation. In an exposure of a film to light, only the light which is absorbed by the emulsion can contribute to the formation of latent image. As a consequence, there is a close parallelism between the absorption coefficient of the emulsion and its photographic sensitivity. There is a similar correlation between absorption and sensitivity for X-rays, as shown in Fig. 1. The absorption curve of silver bromide at the X-ray wave-lengths is plotted with the X-ray sensitivity curve of a silver bromide emulsion as determined by Glocker.[3]

It is also well known that for exposures to light the sensitivity of an emulsion increases with increasing silver halide grain size, all other factors being constant. Eggert[4] has shown quantitatively that a similar relationship holds for exposures to X-rays.

In order to absorb as much of the available X-radiation as possible, X-ray films have emulsion layers two to three

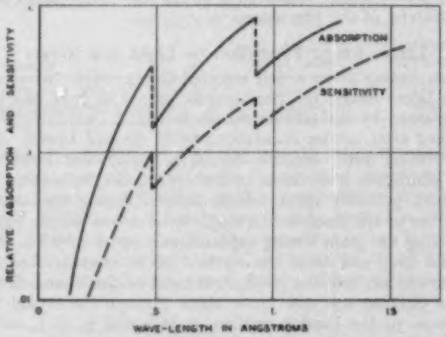

Fig. 1. Comparison of the relative absorption and relative sensitivity of a silver bromide emulsion for X-rays. The similar shapes of the curves indicate that the sensitivity to X-rays is proportional to the fraction of the incident energy which is absorbed.

times the thickness of the layers on films made for use with visible radiation and the emulsion is coated on both sides of the film base. In addition, the ratio of silver bromide to gelatin is higher for X-ray films than for ordinary films. Consequently, about 10% to 20% of the incident X-radiation is absorbed by the film (for X-rays of wavelength about 0.6 Angstrom, which is in the region of effective wavelengths used in much medical work). Because of

* Ansco Research Laboratories, Binghamton, New York. Delivered at the PSA Convention in Baltimore, Maryland, 20 October 1950. Received 15 December 1950.

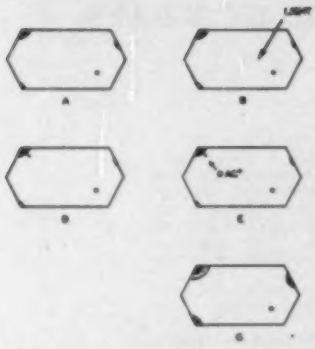

Fig. 2. Schematic illustration of the stages in the formation of the latent image by light showing how an absorbed quantum contributes one atom of silver to the latent image.

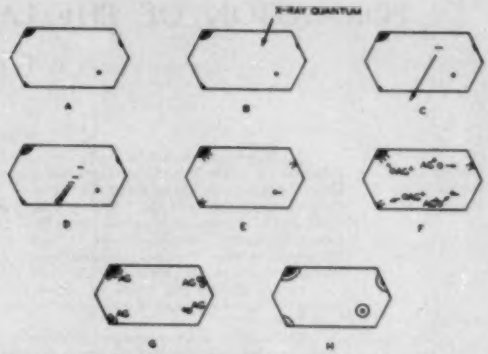

Fig. 3. Schematic illustration of the stages in the formation of the latent image by X-rays showing how the tremendous energy from one quantum results in the formation of a large number of latent-image silver atoms.

processing difficulties it is not practical to increase the emulsion thickness much above the currently used values.

In addition to radiography by direct X-rays, another method is used involving intensifying screens made from compounds of heavy elements such as calcium tungstate and lead barium sulfate. The screens consist of fine crystals of these compounds coated on a suitable support, one screen being placed on each side of and in close contact with the film during exposure. When exposed to X-rays, the screens fluoresce, and the light so produced exposes the film. Under typical conditions of medical radiography, the sensitivity of a screen-film combination is of the order of 50 times the sensitivity of the film alone.

Latent Image Formation by Light and X-rays

According to the widely accepted Gurney-Mott[5] theory of the latent image, the photographic effects of light can be explained by the scheme shown in Fig. 2, which is patterned after similar illustrations by Webb and Evans[6]. An individual silver bromide crystal is represented by (A) in which the black areas in the crystal are the sensitivity specks, probably silver sulfide, formed during the manufacture of the emulsion. A single quantum of visible light striking the grain during exposure may be absorbed in the grain (B) and cause the ejection of an electron from a bromide ion into the conduction band of the crystal. This free electron can now move about through the crystal in a more or less random motion, as indicated in (C), until either it recombines with a bromine atom or, as illustrated in (D), it becomes trapped at one of the sensitivity specks. If the electron recombines with a bromine atom, no latent image is formed; but if it is trapped at a sensitivity speck it will attract to the speck a positively charged silver ion, as shown in (E). Although most of the silver ions in the crystal occupy regular lattice positions and are therefore fixed, some silver ions are not in regular lattice positions and will move to the sensitivity speck under the influence of the negatively charged electron. When the silver ion reaches the speck it combines with the electron to form an atom of silver, as indicated in (F). In this way the speck of silver at the sensitivity center is built up, atom by atom, by the absorption of successive quanta, each quantum resulting in at most one silver atom added to the sensitivity speck. When one or more of the sensitivity centers exceeds a certain critical size the grain becomes developable (G).

One of the problems of latent image theory is to determine how many silver atoms must be formed in order to make a grain developable. The number required depends on several factors, such as the number of competing sensitivity specks and the amount of silver formed at the interior of the grain where it is inacessible to normal developers, but the results of a number of experiments made in this country and abroad indicate that the developable latent image in a fast emulsion contains about ten silver atoms.

In the case of X-rays, the effects of the absorption process are different from the effects of the absorption of visible radiation because of the tremendous differences in the energies involved. A quantum of blue light has a calculated energy of about 3 electron-volts* (ev), and this energy is enough to remove only an outer, loosely-bound electron from a bromide ion. The free electron has only a small kinetic energy and therefore a relatively low velocity. On the other hand, X-ray quanta generated at 65,000 volts, for example, have energies up to 65,000 ev, and this maximum energy is not only enough to eject electrons of both bromide and silver ions, but also to impart to the ejected electrons very high energies.

Latent image formation by X-rays is illustrated in Fig. 3, which is the X-ray analog to Fig. 2 for light. Part (A) of this figure represents an unexposed grain; (B) indicates the absorption of an incident X-ray quantum. The primary electron ejected by the X-ray quantum has a large amount of kinetic energy and passes through the grain at high velocity on a nearly straight line, as shown in (C). In its passage through the grain, the electron ejects, from the ions of the lattice, secondary electrons which are represented in (D) as a series of negative charges along the path of the primary electron. The secondary electrons have low energy, similar to that of the electrons set free by the absorption of a light quantum. They are free to move about

* One electron-volt is the energy imparted to an electron in moving between 2 points whose potential difference is 1 volt.

in the lattice and, just as in the case of light, they may either recombine with the ions from which they were separated or they may be trapped at the sensitivity specks as illustrated in (E). The trapped electrons attract the mobile silver ions of the lattice and thus produce latent image silver as in (F) and (G). Thus, one X-ray quantum, because of its high energy, results in the formation of a large number of atoms of latent image silver. In fact, in the range of quantum energies used in medical radiography, the absorption of one X-ray quantum will almost always produce enough latent image silver to make the grain developable, as in (H). This was shown by Eggert & Noddack[7] who found that each absorbed quantum of effective wavelength .45A (effective quantum energy of 27,400 ev) renders one grain developable.

In addition, it is possible that the primary electron may traverse several grains in the emulsion layer and, depending on the number of secondary electrons produced in each grain, make more than one grain developable. The resulting "track" produced by a high-energy electron has been observed in specially designed nuclear track emulsions.[8]

Quantitative Data on X-ray Sensitivity

In Fig. 4 are shown the ranges of the primary electrons from X-ray quanta of several energies calculated by Hoerlin[3]

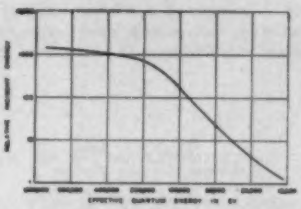

Fig. 5. Variation in the sensitivity of Non-Screen film to X-rays of various quantum energies in terms of the relative amount of incident energy required to produce a net density of 1.5*.

for Ansco Non-Screen Film. Each circle in the diagram indicates one silver halide grain through which the primary electron passes. For example, a primary electron from an X-ray quantum of energy 200,000 ev has a range of about 60 grains. For 12,500 ev and lower quantum energy, the range is only one grain.

The black circles in this figure indicate schematically those grains which are made developable by the ionizing action of the primary electron. At high energies not all the grains hit by the electron are made developable. Instead, predominantly grains near the end of the electron path are made developable. This is due to one of the fundamental characteristics of ionization by charged particles, namely, the amount of ionization per unit path length increases as the velocity of the charged particle decreases. Hence, the primary electron produces relatively few secondary electrons at the beginning of its path, but as its energy and velocity decrease the number of secondary electrons produced in each grain increases. At low X-ray energies, the primary electron loses its energy at such a high rate that every grain which it hits is made developable. In fact, some of the grains may receive much more energy than they require to become developable. They are overexposed.

* Adapted from H. Hoerlin and V. Hicks, Non-Destructive Testing 6, 15(1947).

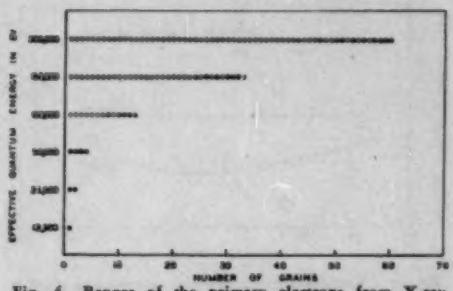

Fig. 4. Ranges of the primary electrons from X-ray quanta of various energies in Non-Screen film. The black circles represent silver halide grains which are made developable by the ionizing action of the electron.

In order to evaluate the efficiency of latent image formation by X-ray quanta of various energies, two aspects must be considered. First, Fig. 5 gives the relative amount of energy per unit area which must strike the film in order to produce a net density of 1.5 in the developed film. (This density level is used because it lies in the range of densities important in practical radiography.) This curve illustrates the overall effect of the variations in absorption and in the efficiency of use of the absorbed energy. On this basis, the overall efficiency decreases as the X-ray quantum energy increases, i.e. more energy must be incident on the film at high quantum energies than at low quantum energies.*

Table I

COMPARISON OF X-RAY AND LIGHT SENSITIVITIES OF NON-SCREEN FILM

Radiation	Energy to Expose Typical Grain	Silver Atoms Required
200,000 ev X-rays	1600 ev	210
Blue light, 4250 Angstroms	300 ev	105

The curve of Fig. 5 is of direct practical importance, but for the study of latent image formation a second aspect must be considered. When an X-ray quantum is absorbed, some of the energy of the quantum is re-emitted as radiation of longer wavelength. The remaining energy is transferred to the primary electron. The amount of energy transferred to the electron varies greatly, depending on the

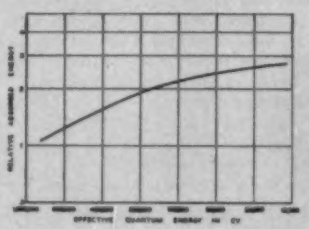

Fig. 6. Variation in the sensitivity of Non-Screen film to X-rays in terms of the relative amount of truly-absorbed energy required to produce a net density of 1.5.

* The sharp breaks due to the K absorption edges, noted in Fig. 1, do not appear here because of the width of the band of quantum energies used in the measurements.

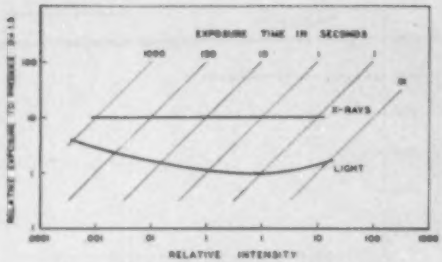

Fig. 7. Variation in the exposure required to produce a net density of 1.5 for various intensities of X-rays and light, showing that the reciprocity law holds in exposures to X-rays but not in exposures to light.

energy of the incident quantum. Obviously, only that portion of the absorbed X-ray energy which is transformed into the kinetic energy of electrons can be useful in latent image formation, and it is called "truly absorbed" energy. Fig. 6[8] gives the relative amount of truly absorbed energy required by Non-Screen film to produce a net density of 1.5 with various X-ray quantum energies. On this basis, the electrons from high-energy quanta are more efficient than those from low-energy quanta, the reverse of the situation in Fig. 5.

The greater efficiency of high-energy electrons must be due to less over-exposure of grains than in the case of low-energy primary electrons. In fact, some grains may be definitely under-exposed by a high-energy electron and therefore require multiple hits to make them developable. This resembles the situation for exposure by light, and it is interesting to compare the efficiencies of latent image formation by light and X-rays.

In Table I are listed the amounts of truly absorbed energy required to render a typical silver halide grain of Non Screen film developable when exposed by light and by X-rays of quantum energy 200,000 ev. Although this emulsion is designed to have high sensitivity to X-rays and low sensitivity to light, 5 times as much energy is required for an X-ray exposure as for a light exposure. The number of silver atoms required to make the grain developable (assuming that all of the available truly absorbed energy goes into the production of silver atoms) is twice as many for X-rays as for light.

The comparatively inefficient action of X-rays, even at high energies, is probably due mainly to the phenomena mentioned earlier—recombination of secondary electrons with their parent ions and formation of internal latent image silver. These phenomena may also affect the formation of latent image by light, especially when the exposure time is extremely short, that is, when the intensity is very high. For exposure times less than about .1 second the sensitivity of most emulsions exposed to light decreases as the exposure time is decreased. This is the phenomenon of high intensity reciprocity law failure and is explained by the Gurney-Mott theory in the following way. The capacity of the sensitivity specks to accommodate un-neutralized electrons is probably restricted to two or three electrons. In a high intensity exposure, electrons may be produced within the grain at a rate faster than that at which the comparatively sluggish silver ions can neutralize them. The excess electrons will be repelled by the major sensitivity specks and will either recombine with bromine atoms or be trapped elsewhere to form internal latent image specks or a number of small latent image specks too small to initiate development. This inefficient use of the electrons accounts for the decrease in speed at high intensities.

In an X-ray exposure the absorption of one quantum by a grain may result in the formation of enough latent image silver atoms to render the grain developable. The secondary electrons, which are trapped at the sensitivity specks in the first stage of latent image formation, are produced during the time interval in which the primary electron is passing through the grain. Even for a comparatively low-energy primary electron, this time interval may be less than 10^{-13} second. In effect, regardless of the rate at which X-ray quanta strike the film, X-ray exposures are almost always made at extremely high intensities, in terms of the number of conduction electrons formed per unit time in an individual grain. Thus, it is to be expected that X-ray exposures would be inherently inefficient for the same reasons that high intensity light exposures are inefficient.

Figure 7 presents data from Morgan[9] to show the comparison of reciprocity law failure for X-ray and light exposures. (The vertical separation of the two curves is arbitrary and therefore does not indicate quantitatively the ratio of light sensitivity to X-ray sensitivity.) It is seen that the curve for light has a minimum at an exposure time of .1 second, or a relative intensity of 1. At higher intensities, increasingly more exposure is required to produce a net density of 1.5. However, Berg [10] has shown that

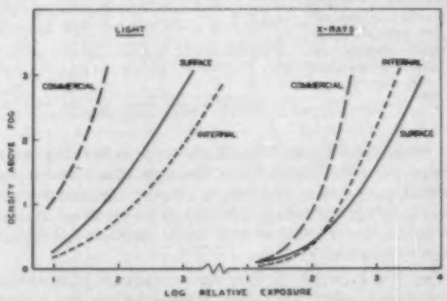

Fig. 8. Characteristic curves for Non-Screen film processed in a surface developer, an internal developer, and in a commercial X-ray developer. Exposure to X-rays produces a larger ratio of internal to surface latent image than does exposure to light.

for an exposure time of about 4×10^{-6} second the reciprocity curve for light exposures becomes horizontal, and no further loss in sensitivity occurs at shorter exposure times. Thus, if the curve for light in Fig. 7 were extended to much higher intensities, and correspondingly shorter exposure times, the curve would eventually become horizontal. As was just pointed out above, in X-ray exposures the effective exposure times for individual grains are of the order of 10^{-13} second, regardless of the total time for which the film is exposed. This means that for X-ray exposures the effective exposure times are in a range where there is no reciprocity law failure, and accounts for the fact that no failure of the reciprocity law is observed

for X-ray exposures, as indicated by the horizontal line in Fig. 7.

The formation of considerable amounts of internal latent image by X-rays has been demonstrated recently by a number of workers[11]. Fig. 8 gives a comparison of the densities obtained with surface and internal developers[12] for both light and X-ray exposures of Non-Screen X-ray film.

It is seen that internal image is produced by both the light and X-ray exposures, but the ratio of internal to surface image is much greater for the X-ray exposure. Commercial X-ray developers are designed to utilize both the surface and internal latent image as much as possible.

Sensitization of X-ray Films

From the above discussion it is evident that the sensitization of a film for X-rays presents some unique problems which are not present in the case of sensitization for light. This was indicated by the work of Sheppard and Trivelli[13] in 1926, when they reported that of two emulsions which they prepared the one made with a sensitizing gelatin had a much higher sensitivity to light than the other made with an inert gelatin, but the sensitivity to X-rays was the same for both emulsions.

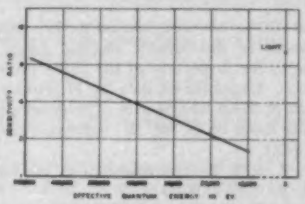

Fig. 9. Ratio of the sensitivity of a gold-sensitized film to the sensitivity of an unsensitized film.

Most of the information in the literature on sensitization for X-rays relates to the use of "intensifiers" which themselves absorb X-radiation and then re-emit some of the energy to the film either as light, or fluorescent X-rays, or as electrons. The intensifiers are placed either in the emulsion itself, in the separate layers of the film, or next to the film. Of these methods, two are in prominent use today—luminescent screens of the type mentioned previously and lead intensifying screens.

Lead has a high X-ray absorption coefficient and, just as for silver bromide, the absorption process results in energetic electrons which penetrate the emulsion lying in contact with the lead foil and expose the grains. Lead screens are particularly advantageous in high-voltage radiography where intensification factors of 2 or 3 are obtained and where the lead also serves as an efficient absorber of radiation scattered from the subject.

In contrast to these methods, which might be called "physical sensitization", very little information on chemical sensitization for X-rays has been published. Increases in X-ray sensitivity by the addition of small amounts of heavy metal compounds, such as those of lead and thallium, have been reported by Mueller[14] and others.[15] The mechanism of these effects is not understood, but they cannot be explained merely by postulating increased X-ray absorption, since the amounts of sensitizer added are too small to cause an appreciable change in the absorption coefficient. Through the utilization of this type of sensitization, Ansco in 1936 introduced the first non-screen type film in this country designed for medical radiography.

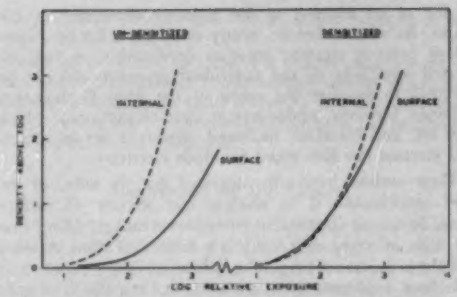

Fig. 11. Characteristic curves of gold-sensitized and unsensitized films exposed to 65 KVP X-rays and processed in surface and internal developers, showing that gold sensitization decreases the ratio of internal to surface latent image.

More recent reports in the literature[10,2] indicate that the X-ray sensitivity of a silver halide emulsion can be increased by the addition of complex gold compounds. Here, also, the amount of sensitizer added is so minute that it does not materially alter the absorption of X-rays by the emulsion. Fig. 9 shows the ratio of sensitivities to X-rays for gold-sensitized and un-sensitized films reported by Hoerlin and Mueller. The ratio varies from unity at low X-ray energies up to as much as 10 for very high-energy quanta. The ratio for light exposures is also 10. The effect for X-rays is illustrated in Fig. 10.

The dependence of this effect on the quantum energy of the X-rays has been postulated by Hoerlin and Mueller

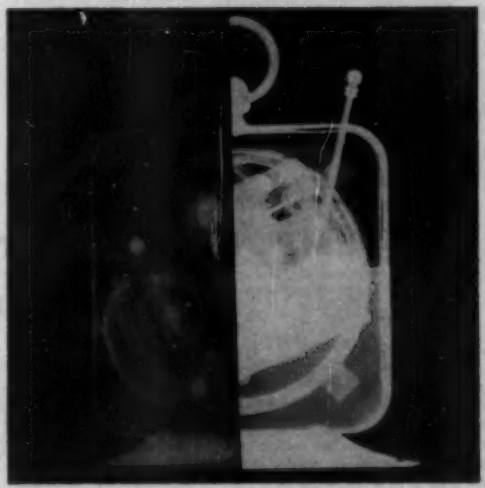

Fig. 10. Radiograph made with gold-sensitized film (left) and unsensitized film (right). The upper halves of both films were placed between lead intensifying screens during exposure (250 KVP X-rays).

as due to an increase in the inherent sensitivity of the grains. As we saw before, nearly every grain hit by a low-energy primary electron becomes developable, so that increased sensitivity of the individual grains would not be expected to increase the speed of the film. High-energy electrons, however, under-expose some of the grains which they hit, and therefore increased sensitivity of the grains will increase the film speed for these electrons.

These authors have also suggested that the effect of the gold sensitization is to increase the amount of surface latent image as opposed to the internal image, citing that the high intensity reciprocity law failure of films exposed to light is decreased by gold sensitization. Their conclusions have been confirmed by recent studies of the effects of gold sensitization on the ratio of internal to surface latent image for an X-ray exposure[12], demonstrated in Fig. 11. The emulsions used were experimental X-ray emulsions, one of which was gold sensitized. The surface and internal developers were the same as those used to obtain the data of Fig. 8. It is seen that the ratio of internal to surface image is much less for the emulsion containing gold.

Further investigation is necessary to define more clearly the mechanism of gold sensitization in terms of modern latent image theory.

It is appropriate to note here that Mitchell[17] has recently proposed a new theory of latent image formation based on a mechanism different from that of the Gurney-Mott theory. Although considerable experimental and theoretical work remains to be done to test the Mitchell theory, it is of special interest in the treatment of the photographic effects of X-rays because it appears to be especially adapted to explaining the formation of internal latent image.

Acknowledgment

It is a pleasure to acknowledge the assistance of Dr. H. Hoerlin in the preparation of this paper.

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12. Unpublished data by H. Hoerlin and R. H. Bingham of these laboratories. The developers used were essentially those of G. W. W. Stevens, Phot. J., Vol. 82, p. 42 (1942).

13. S. E. Sheppard and A. P. H. Trivelli, Phot. J., Vol. 66, p. 505 (1926).

14. R. Koslowsky and H. Mueller, Afga Film Plant, Wolfen, Germany (1936). Bibliography of Scientific and Industrial Reports. (U. S. Dept. of Commerce, Washington) Vol. 8, p. 873 PB 70053, fr. 831-50.

15. German patent 428,898 (1925-6); French Patent 756,422 (1932-3).

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17. J. W. Mitchell, Phil. Mag., Vol. 40, p. 249 and 667 (1949).

A TEMPORAL SEQUENCE CAMERA SYSTEM

JOHN C. BECKMAN*

THE Beckman & Whitley Temporal Sequence Camera System provides a continuous non-intermittent photographic record of the complete sequence of events taking place in a specified region of space and, during the period that this record is being made, time is also being recorded on the film with a precision of 1 part in one hundred thousand. The resulting record is a position-time photograph where the ordinate is position and the abscissa (along the length of the film) is time.

The camera system is able to measure both acceleration and velocity of an object traveling along a track or launcher, (Fig. 1) by either a direct measurement from the optical image or by triggering auxiliary time markers on the film with electrical contacts mounted along the launcher. A precision of ½ mile per hour at 1000 miles per hour is possible. An optical image taken after the object has left

* Beckman & Whitley, Inc., San Carlos, California. Received 20 November, 1950.

Fig. 1. The Temporal Sequence Camera recording movement of an object along a track. Power Supply and Timer Control units are in operation.

the launcher will give velocity and acceleration of the object in space.

Other typical applications are determination of flight time and detonation point of shells or of bombs from aircraft, continuous record of an object striking or entering a surface, recording of linear non-uniform motion such as oscilloscope traces, recording of electrical impulses from many types of transducers, and indoor intermittent time and position sequence photographs produced by lighting the subject with stroboscopic lamps during its motion. The measurement of the opening and closing time and pattern of an interlens shutter would be a further example of the use of the camera.

Some of the above uses typify a unique characteristic of this camera. The camera continuously provides unexposed film that is at all times ready to record an event, and since this process is carried on non-intermittently, the beginning of the event is always recorded.

Description of the Camera

The camera moves unperforated 35mm film uniformly in either direction behind an adjustable vertical slit by means of one of two rubber covered rolls (Fig. 2). The friction drive avoids striations of the image that could be produced on perforated films by mismatch of the film pitch and the sprocket pitch. The winding direction may be selected by a knob at the back of the camera. Winding speed is infinitely controllable in either direction from 0 inch per second to approximately 100 inches per second by means of a second knob also at the back of the camera. Alignment and focusing are provided for by a sighting hole in the back of the camera above and between the film controls.

In Fig. 2 one of the two identical, interchangeable film magazines is in place. These hold a maximum of 120 feet of film on a special core and each is equipped with a footage indicator visible from the outside of the camera through the two glass covered windows in the lid. Cam buttons in the cover register with and actuate cams when the cover is lowered. These cams open light traps in the magazines and simultaneously advance the pressure-roll idlers against the film drive rolls, readying the camera for

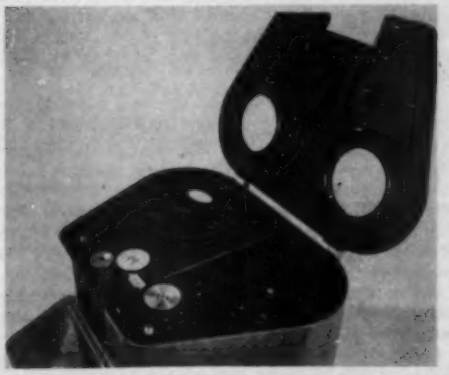


Fig. 2. Interior of the camera showing right- and left-hand drive rollers. One film magazine is in place.

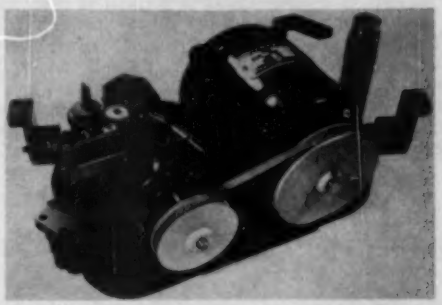


Fig. 3. Drive unit. The cone and friction ring planetary speed reducer (left) is continuously adjustable in output speed from 0 to 3000 rpm.

operation. The camera drive unit (Fig. 3) is mounted on rubber shear members in the lower part of the camera housing. The cone and friction ring planetary speed reducer (left side Fig. 3) is continuously adjustable in output speed from 0 to 3000 rpm.

Description of Timing System

When in motion the film receives timed images (Fig. 4) in addition to that of the object being studied. A set of

Fig. 4. Time record on edge of 35mm film (enlarged). Numbers indicate to .01 seconds. Pips mark .001 seconds. An additional row of pips (not shown) may be recorded to the right from a second channel.

five Arabic numerals is supplied by a cumulative counter driven by a synchronous motor and exposed each .01 second by a SA-309 multiple-short-duration flash tube. The counter recycles each 1000 seconds and may be reset from the outside of the timer. Pip marks between these numerals, indicating thousandths of seconds (capable of interpolation to ten-thousandths), are recorded by means of NE-48 neon lamps with appropriate optics for shaping the pip. Auxiliary pips which can be controlled by electrical impulses derived from an external time standard of whatever sort desired, either as a regular sine-wave or as negative pulses, may also be recorded in another channel. This second pip channel also provides a method of coordinating an event or sequence of events—regular or irregular in character—by actuation from related negative pulses.

Impulses and power to operate the timer are provided by the Timer Control Unit and the Power Supply Unit. A 100 cps tuning fork oscillator with basic accuracy of 1 part in 100,000 supplies the standard frequency. This signal is amplified and used to drive the synchronous motor. The power supply is electronically regulated and the equipment is operative between 105 and 130 volts. Pulsed voltage to energize the .001 Sec. neon lamp in the camera is also derived from the tuning fork frequency through cascading multivibrators. Monitoring of synchronization between tuning fork and final multivibrator is permitted by inclusion of a 1 inch cathode ray tube located in the Timer Control Unit panel.

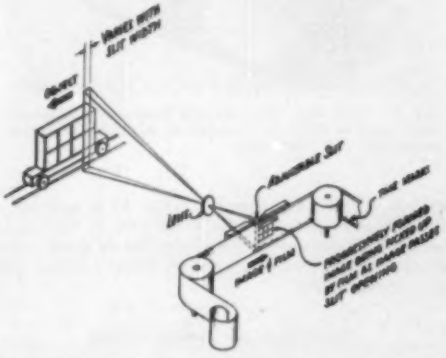


Fig. 5. Schematic illustration of scanning a moving object with a stationary camera slit exposing a moving film.

The formation of an image by the camera is shown graphically in Fig. 5. From this sketch it is apparent that the object is photographed only during the time it is in the optical plane created in space by the projection of the slit through the camera lens. The object is shown part way through this plane and hence has not appeared in its entirety on the film. The resulting image on the film may bear a close resemblance to the original object or it may assume a variety of distortions depending on the relative velocities of the film and the image. Some examples of simple distortions are given in Fig. 6. Other interpretable configurations reveal pitching, yawing, spinning, climbing, diving and other motions. Therefore, a great deal of information can be obtained about the activity of the object from what appears to be a single picture. All pictures taken so far are classified.

Fig. 6. Examples of picture distortions obtainable with variations between object speed and film movement.

Specifications

Size and Weight: The assembly shown in Fig. 1 measures 13 x 13 x 10 in. high (excluding handles and knobs on top) and is designed to mount on a Mitchell tripod or equivalent. The weight is approximately 60 lbs. The Power Supply Unit and Timer Control Unit are each housed in aluminum containers measuring 14 x 21 x 11 3/16 in. high, and their approximate weight respectively is 80 and 50 pounds.

Micrometer Slit: The width of the slit is adjustable from 0 to .270 inches using an external knob calibrated in .001 inches. The slit blades are of hardened and polished stainless steel.

Lens: The lens opening is designed to accommodate a standard Mitchell lens adaptor. The proper focal length lens is determined by the test conditions and the lens need not have a shutter. The film plane is visible through a 2× magnifier to aid in focusing.

Power Input: 105-130 volts 60 cps 4 amperes steady state with 10 amperes transient load for camera motor start.

Results: A velocity of 1000 miles per hour may be measured to ½ mile per hour. Below this velocity the precision is increased, and above this velocity the precision is reduced.

Silver Image Development by Derivatives of p-Phenylenediamine*

II. Dependence of Rate on Structure

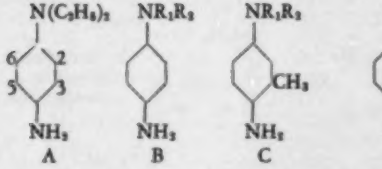
T. H. James

SUMMARY

The rate of silver image development by sixty-two derivatives of *p*-phenylenediamine was determined at pH 11.0 and 12.7 in the absence of sulfite or coupler, and at pH 11.0 in the presence of sulfite and coupler. The coupler increases the rate of development by the large majority of the agents tested, usually by twofold or more. The effect of sulfite upon the rate of development roughly parallels that of the coupler, but generally is smaller in magnitude. When sulfite or coupler produces a substantial increase in the development rate, an induction period often appears even when none existed in the absence of these substances. Some agents show an induction period in the absence of sulfite or coupler, and the induction period is usually relatively larger at pH 12.7 than at pH 11.0, although exceptions are noted. The emulsion speed generally increases with increasing half-wave potential for values more positive than —120 millivolts, but shows no systematic dependence on potential for values more negative than this.

THE PRESENT PAPER deals with the results of an investigation of the silver-image developing properties of sixty-two derivatives of *p*-phenylenediamine. For convenience in tabulating the results, these derivatives can be divided into the following groups:

(A) ring-substituted 4-aminodiethylanilines, (B) 4-amino-R_1,R_2-anilines, (C) 4-amino-3-methyl-R_1,R_2-anilines, (D) 4-amino-3-ethoxy-R_1,R_2-anilines, and (E) derivatives in which one nitrogen forms a part of a heterocyclic ring. The general formulas for the first four groups are as follows:



A B C D

The formulas and names of the heterocyclic derivatives are listed in Table I, together with the code numbers by which they will be designated in the presentation of the data.

The experimental procedure was the same as that described in Part I.[1] The developing agents used were prepared by R. Bent, J. Thirtle, and A. Weissberger, of these Laboratories. The preparation is described elsewhere.[2] The photographic material used was a motion-picture positive film of moderate contrast. (It is not the same as the film used in Part I.) Rate measurements were made at pH 11.0 in the presence of sulfite, in the presence of the coupler, sodium 1-naphthol-5-sulfonate, and in the absence of both. Rate measurements also were made at pH 12.7 in the absence of sulfite and coupler. The developing agents were always used in 0.0025 *M* solution containing 0.0033 *M* potassium bromide. The development rates are expressed in terms of $1/t$, where t is the time required to give a density of 0.2 above fog for $\log E = 1.75$, and in terms of k, where k is defined by the equation:

$$dD/dt = k(D_{max} - D) \quad .$$

The induction-period coefficients, I. C., were calculated as described in Part I.

Rate data and induction coefficients are given in Tables II to IV. The k values for development at pH 11.0 in the absence of sulfite and coupler are listed as k_o; those for development in the presence of sulfite are listed as k_s, and those for development in the presence of coupler are listed as k_c. The amount of sulfite employed was 8.67 grams per liter; the amount of coupler was 3.33 grams per liter.

The ratios, k_s/k_o and k_c/k_o, indicate the relative effects of sulfite and coupler on the rate of development. These ratios are listed for the various developing agents in Tables V to VII. In the same tables are listed the ratios of the

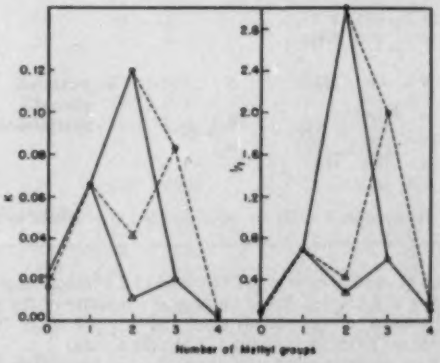
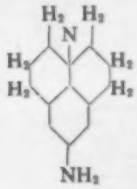
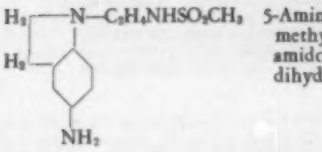
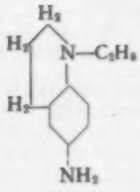
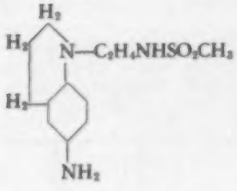
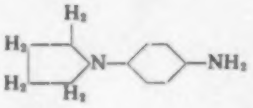
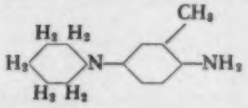
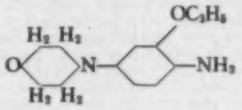
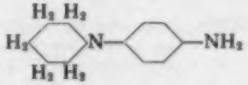
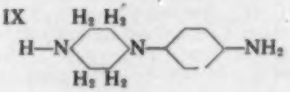
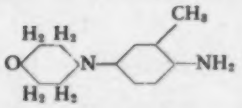
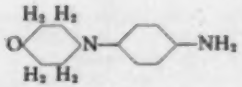


Fig. 1—Plot of reaction rate against the number of methyl groups for N,N'-substituted *p*-phenylenediamines. Solid lines represent development in absence of sulfite or coupler. Broken lines represent development in presence of sulfite. The triangles represent the unsymmetrical dimethyl compound.

*Communication No. 1368 from the Kodak Research Laboratories. Received September 19, 1950. Part one appeared in the fourth issue (Nov. 1950).

Table I

DERIVATIVES OF *p*-PHENYLENEDIAMINE IN WHICH ONE NITROGEN FORMS PART OF A HETEROCYCLIC NUCLEUS

Code No.	Formula	Name
I		9-Aminojulolidine
II		5-Amino-1-(β-methylsulfonamidcethyl)-2,3-dihydroindole
III		6-Amino-1-ethyl-1,2,3,4-tetrahydroquinoline
IV		6-Amino-1-(β-methylsulfonamidoethyl)-1,2,3,4-tetrahydroquinoline
V		1-(*p*-Aminophenyl)-pyrrolidine
VI		1-(4-Amino-*m*-tolyl)-piperidine
VII		1-(4-Amino-3-ethoxyphenyl)-morpholine
VIII		N-(*p*-Aminophenyl)-piperidine
IX		N-(4-Aminophenyl)-piperazine
X		N-(4-Amino-*m*-tolyl)-morpholine
XI		N-(*p*-Aminophenyl)-morpholine

Compounds V to XI are either disclosed in or covered by U. S. Patent 1,937,844, assigned to B. F. Goodrich Company.

rates of development at pH 11.0 and 12.7 in the absence of sulfite and coupler. These ratios give a measure of the pH dependence of the various agents in this pH range. The ratios are given for both the $1/t$ and the k rates.

Rate determinations were made also on *p*-phenylenediamine and its mono-, di-, tri-, and tetra-N-methyl derivatives to determine the effect of successsive replacement of the hydrogens of the amino groups. Data are given in Table VIII for this series of compounds. The development rates for pH 11.0 are plotted as a function of the number of methyl groups in Figure 1. The solid lines connect the points representing the development rates in the absence of coupler or sulfite; the broken lines connect the points representing development in the presence of sulfite. It is noted that sulfite has little effect upon the rates of development by *p*-phenylenediamine, the monomethyl derivative, and the symmetrical or N,N'-dimethyl derivative, but it increases the rates of development by the other members of the series. The maximum rate of development is given by the symmetrical dimethyl *p*-phenylenediamine. Both

Table II

RATES OF DEVELOPMENT BY RING-SUBSTITUTED 4-AMINODIETHYLANILINES

Ring Substituent	No Addn., pH 11.0 1/t	k,	I.C.	Na_2SO_3, pH 11.0 1/t	k,	I.C.	Coupler, pH 11.0 1/t	k,	I.C.	No Addn., pH 12.7 1/t	k	I.C.
3-NH_2	3.3	0.098	0	5.0	0.103	0	3.3	0.098	0	4.0	0.135	0
3-OH	2.5	.132	0	2.5	.132	0	2.5	.132	0	1.7	.066	0
3-NHC_2H_5	2.5	.078	0	4.0	.100	0	2.5	.078	0	2.5	.094	0
3-$N(CH_3)_2$	2.2	.065	0	2.2	.065	0	2.2	.065	0	2.8	.088	0
3-$NHSO_2CH_3$	1.7	.078	0	1.7	.072	0	1.7	.072	0	1.05	.064	0
3,5-diCH_3	1.0	.040	0	1.9	.066	0	1.0	.040	0	2.9	.093	0
3-CH_3	0.80	.026	0	1.61	.070	0.11	1.66	.096	0.25	3.3	.114	0
3-OC_2H_5	.71	.015	0	2.5	.078	0	1.75	.059	0	2.5	.093	0
—	.53	.019	0	0.77	.057	0.32	0.91	.097	0.64	1.9	.102	0.20
3-$C_2H_4NHSO_2CH_3$	.43	.016	0.11	.63	.048	.38	.67	.068	.66	0.67	.035	.11
3-$C_2H_4NHCOCH_3$	.36	.014	.08	.45	.039	.44	.47	.054	.79	1.37	.061	.07
3-$NHCOCH_3$	.31	.028	.53	.27	.042	1.3	.22	.045	1.9	1.25	.073	.18
3-CH_2OH	.29	.011	0	.48	.043	0.46	.53	.062	0.87	1.7	.080	.07
3-OCH_3	.27	.014	0	2.4	.094	0	1.62	.077	0	3.4	.101	—
3-$CH_2NHSO_2CH_3$	.21	.011	.16	0.26	.035	1.0	—	—	—	—	—	—
2-OCH_3,5-CH_3	.13	.013	.85	.091	.018	1.8	—	.031	1.7	0.50	.045	.54
3-Cl	.091	.0039	0	.10	.0067	0.28	0.14	.016	1.1	.20	.0094	.05
2-OCH_3	.032	.0016	—	—	—	—	.008	.0007	—	.10	.015	—
2-NH_2	.029	—	—	.015	—	—	.029	—	—	.02	—	—
2,5-diCH_3	.0096	.00083	—	—	—	—	.020	.0021	—	.10	.0185	—
2-CH_3	.0038	—	—	—	—	—	—	—	—	—	—	—
2-$NHCOCH_3$	.0014	—	—	—	—	—	—	—	—	—	—	—

Table III

RATES OF DEVELOPMENT BY 4-AMINO-R_1R_2-ANILINES

R_1R_2	No Addn., pH 11.0 1/t	k,	I.C.	Na_2SO_3, pH 11.0 1/t	k,	I.C.	Coupler, pH 11.0 1/t	k,	I.C.	No Addn., pH 12.7 1/t	k	I.C.
C_2H_5,C_2H_7	0.58	0.021	0	0.95	0.059	0.24	1.10	0.092	0.50	1.29	0.099	0.40
C_2H_7,C_2H_7	.53	.020	0	.95	.052	.21	1.05	.074	.29	0.83	.049	.30
C_2H_5,$C_2H_4NH_2$	.50	.037	.55	.50	.043	.56	0.40	.041	.75	1.14	.066	.27
C_2H_5,C_2H_5	.44	.017	0	.77	.053	.32	.84	.080	.64	1.65	.099	.20
CH_3,C_2H_7	.44	.016	0	.77	.050	.30	.90	.072	.40	1.37	.090	.25
C_2H_5,C_2H_4OH	.42	.017	.02	.53	.045	.54	.60	.065	.93	1.33	.083	.20
CH_3,C_4H_9	.37	.014	0	.69	.044	.25	.81	.070	.50	0.73	.061	.50
CH_3,C_2H_5	.34	.013	0	.55	.044	.40	.61	.069	.80	1.29	.086	.25
CH_3,CH_3	.30	.012	.05	.42	.041	.80	.44	.057	1.1	1.11	.085	.33
C_2H_5,$CH_2CHC_2H_4CH_2$ (O)	.20	.0098	.10	.26	.023	.30	.345	.046	1.2	0.36	.032	.6
C_2H_5,$C_2H_4NHSO_2CH_3$	.18	.0073	.07	.23	.028	1.1	.27	.045	1.6	.32	.044	1.1
C_2H_5,$C_2H_4NHCOCH_3$	.16	.0071	.06	.22	.025	1.0	.26	.034	1.0	.50	.049	0.7
C_2H_5,$C_2H_4N(CH_3)SO_2CH_3$	.15	.0056	.02	.23	.025	0.80	.29	.036	0.94	.36	.035	.7
C_2H_5,$C_2H_4OC_2H_5$	.15	.006	.12	—	—	—	.31	.040	1.1	.56	.050	.65
H,H	.073	.021	1.9	.062	.016	—	.070	.018	—	.59	.088	.86
C_2H_5,CH_2CONH_2	.037	.0027	.26	.037	.0044	1.0	.050	.0093	—	.11	.016	1.2
4-Amino-3-Methyl-R_1R_2-Anilines												
C_2H_5,C_2H_5	.80	.026	0	1.61	.070	0.11	1.66	.096	0.25	3.3	.11	0
C_2H_5,C_2H_4OH	.67	.029	.03	0.91	.070	.33	1.06	.094	.54	2.8	.086	0
C_2H_5,$CH_2CHC_2H_4CH_2$ (O)	.67	.027	0	.83	.037	.31	0.91	.060	.62	1.8	.081	0
C_2H_5,$C_2H_4N(CH_3)SO_2CH_3$	.39	.017	.03	.54	.047	.52	.55	.063	.18	1.28	.075	0.14
C_2H_5,$C_2H_4NHSO_2CH_3$	.38	.018	.09	.48	.046	.67	.56	.057	.57	0.59	.048	.36
CH_3,$C_2H_4NHSO_2CH_3$	.37	.019	.14	.45	.044	.60	.47	.062	.88	.55	.046	.22
C_2H_5,CH_2CONH_2	.093	.0088	.56	.093	.015	1.4	.11	.020	2.0	.43	.070	1.3
4-Amino-3-Ethoxy-R_1R_2-Anilines												
C_2H_5,C_2H_5	.71	.015	0	2.5	.078	0	1.75	.059	0	2.5	.093	0
C_2H_5,$C_2H_4NHSO_2CH_3$	.29	.01	0	1.2	.045	0	1.0	.048	0	0.71	.046	—
C_2H_5,$C_2H_4N(CH_3)SO_2CH_3$	.13	.01	0	1.2	.07	0.17	1.0	.045	0.05	1.0	.046	0

Table IV

RATES OF DEVELOPMENT BY HETEROCYCLIC p-PHENYLENEDIAMINES

Code No.	No Addn., pH 11.0 1/t	k_o	I.C.	Na_2SO_3, pH 11.0 1/t	k_o	I.C.	Coupler, pH 11.0 1/t	k_o	I.C.	No Addn., pH 12.7 1/t	k	I.C.
I	2.3	0.088	0	4.7	0.155	0	5.0	0.178	0	6.0	0.174	0
II	2.0	.069	0	3.0	.100	0	3.4	.118	0	2.5	.106	0
III	1.4	.050	0	1.7	.060	0	4.5	.125	0	5.0	.213	0
IV	1.0	.035	0	1.9	.074	0	2.5	.110	0.14	1.7	.091	0.18
V	0.83	.034	0	2.2	.102	0	2.6	.128	.13	4.4	.151	0
VI	.12	.0045	0	0.175	.028	1.25	0.19	.034	1.7	0.82	.048	0.22
VII	.06	.003	0	.05	.013	3.5	.09	.013	1.0	.32	.037	.8
VIII	.054	.0023	0.06	.071	.010	1.1	.080	.017	1.5	.34	.041	.88
IX	.013	.00065	—	—	—	—	—	—	—	.05	.0057	—
X	.010	.00073	.37	—	—	—	.013	.0032	2.3	.069	.014	1.8
XI	.0012	—	—	—	—	—	—	—	—	—	—	—

p-phenylenediamine and its monomethyl derivative show appreciable induction periods at pH 11.0, but the other members of the series show no induction periods. The unsymmetrical dimethyl *p*-phenylenediamine is much less active as a silver-image developer than the symmetrical, but the latter is not useful as a color developer since it fails to couple to form a dye.

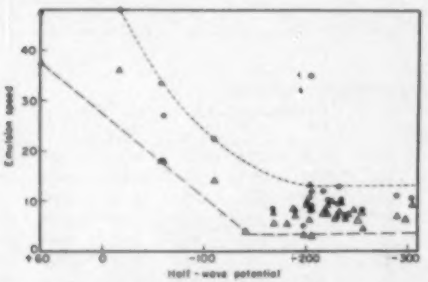


Fig. 2—Plot of emulsion speed against polarographic half-wave potentials at pH 11.0. Triangles represent data for gamma of 0.5; circles represent data for gamma of 1.0. Values for the half-wave potentials are in reference to the standard calomel half-cell, and the Lewis-Randall convention is followed.

Emulsion speeds were determined for many of the developing agents, with development carried to gammas of 0.50 and 1.0. Speed and fog values for development to a gamma of 1.0 in the presence of sulfite are given in Tables V and VI. Speed values were determined as 10/E, where E is the exposure required to give a density of 0.10 above fog. Data for the heterocyclic compounds were incomplete, and are not given. Data for development in the presence of coupler are similar to those for development in the presence of sulfite. Data for development in the absence of sulfite or coupler are not given here because of lack of space in the tables, but are used in the construction of Figure 2, which is discussed at the end of this paper.

Conclusions

The effect of structure on the activity of the various developing agents tested has been discussed in detail elsewhere,[3] and will not be treated in this paper. However, several generalizations on the effect of the various constitutents of the developing *solution* upon the rate of development ca . be drawn from the data presented here.

The coupler, sodium 1-naphthol-5-sulfonate, increases the rate of development by the large majority of the agents tested. This increase is usually greater than twofold. The only N-substituted derivative of *p*-phenylenediamine of the groups listed in Tables VI and VII, for which marked acceleration was not obtained, was 4-amino-N-(β-aminoethyl)-N-ethylaniline. Of the group of ring-substituted 4-aminodiethylanilines containing substituents in the 3-position, the coupler did not increase the rate of development by the -OH, $-NH_2$, $-NHC_2H_5$, $-N(CH_3)_2$, and $-NHSO_2CH_3$ derivatives. All of these are very active agents, however, and the reaction rates measured are at least partially controlled by diffusion. This cannot be the complete explanation, however, since the k_o values for the latter three compounds are somewhat smaller than that for 9-aminojulolidine, and development by it is increased twofold by the addition of coupler. The coupler has no effect upon development by the derivative containing methyl groups in the 3- and 5-positions in the ring, since this substitution effectively blocks reaction between oxidized developer and the coupler. The effect of the coupler in decreasing the rate of development by the derivative containing the $-OCH_3$ group in the 2-position has not been explained.

The effect of sulfite upon the rate of development roughly parallels that of the coupler, but when both agents produce an increase in development rate, the increase produced by the coupler is generally greater than that produced by the sulfite.

Developers for which the ratios, k_c/k_o and k_s/k_o, are less than or equal to 1.3 show no induction period, either in the absence or presence of sulfite or coupler. Only one exception was noted, 4-amino-N-(β-aminoethyl)-N-ethylaniline. However, several developers for which the rate ratios were relatively high did not show induction periods.

When sulfite or coupler produces a substantial increase in development rate, an induction period often appears in the presence of sulfite or coupler even when none existed in the absence of the addendum. However, no induction period appeared for the developers containing the OR group in the 3-position in the ring or for some of the *p*-phenylenediamine derivatives in which one nitrogen forms a part of a heterocyclic ring, even though the sulfite or coupler produced an increase in rate of several fold.

Table V

EFFECT OF SULFITE, COUPLER, AND pH ON RATES OF DEVELOPMENT
RING-SUBSTITUTED 4-AMINODIETHYLANILINES

Ring Substituents	k_c/k_o	k_c/k_o	k_c/k_o	$\frac{t(11)}{t(12.7)}$	$\frac{k(12.7)}{k(11)}$	Sulfite Speed (γ=1.0)	(pH 11) Fog (γ=1.0)
3-$NHSO_2CH_3$	0.92	0.92	1.0	0.6	0.9	40	0.03
3-OH	1.0	1.0	1.0	0.7	0.5	>40	> .45
3-$N(CH_3)_2$	1.0	1.0	1.0	1.3	1.4	45	.08
3-NH_2	1.1	1.0	0.9	1.2	1.4	38	.41
3-NHC_2H_5	1.3	1.0	0.8	1.0	1.2	70	.38
3-$NHCOCH_3$	1.5	1.6	1.1	4.0	2.6	—	N
3-Cl	1.5	4.1	2.4	2.2	2.4	12	N
3-CH_3	2.7	3.7	1.4	4.1	4.4	15	N
3-$C_2H_4NHCOCH_3$	2.7	3.8	1.4	3.8	4.2	9	N
—	3.0	5.1	1.7	3.6	5.4	13	N
3-$C_2H_4NHSO_2CH_3$	3.0	4.2	1.4	1.6	2.2	14	N
3-$CH_2NHSO_2CH_3$	3.2	—	—	—	—	11	N
3-CH_2OH	3.9	5.6	1.4	5.8	7.3	14	N
3-OC_2H_5	5.2	3.9	0.75	3.5	6.2	55	.10
3-OCH_3	6.7	5.5	0.82	12.6	7.4	—	—
2-OCH_3	—	0.44	—	3.1	8.0	12	N
2-OCH_3,5-CH_3	1.4	2.4	1.7	3.8	3.2	8	N
3,5-diCH_3	1.6	1.0	0.6	2.9	2.4	18	N
2,5-diCH_3	—	2.5	—	10.4	22.3	10	.04
2-NH_2	—	—	—	0.7	—	—	—

Table VI

EFFECT OF SULFITE, COUPLER, AND pH ON RATE OF DEVELOPMENT BY:

R_1,R_2	k_c/k_o	k_c/k_o	k_c/k_o	$\frac{t(11)}{t(12.7)}$	$\frac{k(12.7)}{k(11.0)}$	Sulfite Speed (γ=1.0)	(pH 11) Fog (γ=1.0)
4-Amino-R_1,R_2-Anilines							
$C_2H_5,C_2H_4NH_2$	1.2	1.1	0.9	2.1	1.8	—	—
C_2H_5,CH_2CONH_2	1.6	3.4	2.1	4.9	5.6	16	0.03
$C_2H_5,CH_2CHC_2H_4CH_2$ (O ring)	2.3	4.7	2.0	2.7	3.2	13	N
C_2H_7,C_2H_7	2.6	3.7	1.4	1.6	2.5	12	.03
C_2H_5,C_2H_4OH	2.7	3.8	1.4	4.5	4.9	12	N
C_2H_5,C_2H_7	2.8	4.4	1.6	4.3	4.7	14	N
CH_3,C_2H_7	3.1	4.3	1.4	4.8	5.6	13	N
CH_3,C_4H_9	3.2	4.9	1.6	3.1	4.4	12	.03
CH_3,C_2H_5	3.3	5.3	1.6	6.5	6.6	11	N
CH_3,CH_3	3.4	4.7	1.4	5.9	7.1	12	N
$C_2H_5,C_2H_4NHCOCH_3$	3.5	4.8	1.4	6.2	6.9	11	N
$C_2H_5,C_2H_4NHSO_2CH_3$	3.8	6.2	1.6	3.8	6.0	12	N
$C_2H_5,C_2H_4N(CH_3)SO_2CH_3$	4.5	6.4	1.4	3.7	6.2	13	N
$C_2H_5,C_2H_4OC_2H_5$	—	6.7	—	7.0	8.3	—	—
4-Amino-3-Methyl-R_1,R_2-Aniline							
C_2H_5,CH_2CONH_2	1.7	2.2	1.3	4.6	8.0	9	N
$C_2H_5,CH_2CHC_2H_4CH_2$ (O ring)	2.1	2.2	1.1	2.7	3.0	18	N
$CH_3,C_2H_4NHSO_2CH_3$	2.2	3.1	1.4	1.5	2.4	12	N
C_2H_5,C_2H_4OH	2.4	3.2	1.3	4.2	3.0	15	N
$C_2H_5,C_2H_4NHSO_2CH_3$	2.6	3.2	1.2	1.6	2.7	13	N
$C_2H_5,C_2H_4N(CH_3)SO_2CH_3$	2.8	3.7	1.3	3.3	4.4	13	.03
4-Amino-3-Ethoxy-R_1,R_2-Anilines							
C_2H_5,C_2H_5	5.2	3.9	0.75	3.5	6.2	55	.10
$C_2H_5,C_2H_4NHSO_2CH_3$	4.5	4.8	1.1	2.4	4.6	40	.03
$C_2H_5,C_2H_4N(CH_3)SO_2CH_3$	7.0	4.5	0.6	7.7	4.6	30	.05

The ratio of rates at pH 12.7 to rates at pH 11 varied widely among the compounds tested. Two of the ring-substituted 4-aminodiethylanilines, the 3-OH and 3-NH_2 compounds, developed less rapidly at pH 12.7 than at pH 11.0. Neither of these compounds shows any induction period at either pH value. Both give heavy fog at pH 12.7, and the lowered rate of image development may be connected in some way with the higher fogging tendency.

The induction period is relatively larger at pH 12.7 than at 11.0. Many of the developers which show no induction period at 11.0 show one at 12.7. However, the following developers show a larger relative induction period at 11.0 than at 12.7: 4-amino-N-(β-aminoethyl)-N-ethylaniline, 3-acetamido-4-amino-N,N-diethylaniline, and 4-amino-N,N-diethyl-6-methoxy-*m*-toluidine. None of the agents tested showed an induction period at pH 8.7.

The appearance of an induction period in development by some of the derivatives of *p*-phenylenediamine is an interesting phenomenon which has not been reported before (excluding *p*-phenylenediamine itself). The charge effect is an important factor in determining the induction period of developing agents which react in the form of negative ions,[2] and ionization at high pH values is involved in some of the derivatives of *p*-phenylenediamine, particularly those containing the -$NHCOCH_3$ and -$NHSO_2CH_3$ groups. Indications that the charge effect is in some measure responsible for the induction period were obtained in some experiments with quaternary salts. With 4-amino-N,N-diethyl-3-(β-methylsulfonamidoethyl)-aniline as developing agent, the image appeared in one minute on film which had been bathed for forty-five minutes in an 0.2 percent solution of lauryl pyridinium *p*-toluenesulfonate, followed by a one-minute rinse in water, whereas the image did not appear until after one minute twenty seconds in film which had simply been bathed in water. An even more marked acceleration of development in the induction-period region was obtained by the quaternary salt treatment when the developer was 4-amino-N-ethyl-N-(β-methylsulfonamidoethyl)-aniline. However, the quaternary salt inhibited development by both agents during the later stages, and this inhibition appears to be a

general effect with the *p*-phenylenediamine developers. The quaternary salts also markedly inhibit the silver-catalyzed reduction of silver ions from solution by *p*-phenylenediamine derivatives, possibly because of adsorption of the quaternary salts by silver.

There is further evidence of a participation of the charge effect in the induction period of the compounds mentioned in the preceding paragraph. The induction period of 4-amino-N-ethyl-N-(β-methylsulfonamidoethyl)-aniline is larger than that of the corresponding 4-amino-N-ethyl-N-(N'-methyl-β-methylsulfonamidoethyl)-aniline, in which the ionizable hydrogen has been replaced by a methyl group. However, replacement of the ionizable hydrogen by the methyl group only *decreases* the induction period. Some induction period remains. Moreover, 4-amino-N-(β-aminoethyl)-N-ethylaniline and 4-amino-N,N-diethyl-6-methoxy-*m*-toluidine, neither of which contains ionizable hydrogens, show substantial induction periods in the absence of sulfite or coupler. Evidently, there is another factor of importance involved in the appearance of induction periods among some derivatives of *p*-phenylenediamine.

In Part I, it was shown that some reaction product of oxidized developer and sulfite or coupler accelerated development by certain agents. An induction period which appeared only in the presence of sulfite or coupler could be explained on this basis. It is possible that with some developing agents an oxidation product of the agent itself accelerates development, and this may be the cause of the induction period which appears in the absence of sulfite or coupler. The instability of such oxidation products thus far has prevented direct photographic tests of this suggestion.

Some correlation can be made between the emulsion speeds and the half-wave potentials of the developing agents. This is shown in Figure 2, in which the speed values are plotted against the half-wave potentials of the developing agents, as determined polarographically by W. R. Ruby and D. Julian[2,3] of these Laboratories. For potentials more positive than —120 to —140 millivolts, the emulsion speed increases with increasing potential. For potentials more negative than —140 millivolts, the speed is independent of the potential. One agent, 4-amino-N-(β-aminoethyl)-N-ethylaniline, gave an exceptionally high speed (35) for its potential (—204 millivolts). In general, it is noted that high speed values are attended by high fog values. Noteworthy exceptions appear among some compounds containing the $-NHSO_2CH_3$ group. Thus, 4-amino-N,N-diethyl-3-methylsulfonamidoaniline and 4-amino-N-ethyl-N-(β-methylsulfonamidoethyl)-*m*-phenetidine give exceptionally low fog values for high speed values. The same was true of 6-amino-1-(β-methylsulfonamidoethyl)-1,2,3,4-tetrahydroquinoline in comparison with 6-amino-1-ethyl-1,2,3,4-tetrahydroquinoline.

Table VII

EFFECT OF SULFITE, COUPLER, AND pH ON RATES OF DEVELOPMENT OF HETEROCYCLIC *p*-PHENYLENEDIAMINES

Code No.	k_s/k_o	k_s/k_o	k_c/k_o	$\frac{t(11)}{t(12.7)}$	$\frac{k(12.7)}{k(11)}$
III	1.2	2.5	2.1	3.5	4.3
II	1.4	1.7	1.2	1.25	1.5
I	1.8	2.0	1.15	2.4	2.0
IV	2.1	3.1	1.5	1.7	2.6
V	3.0	3.8	1.3	5.3	4.4
VIII	4.5	7.4	1.7	6.3	17.9
VII	4.7	4.0	0.85	5.3	12.3
X	—	4.4	—	6.9	19.2
VI	6.1	7.6	1.2	6.8	10.7

Table VIII

RATES OF DEVELOPMENT BY N,N'-SUBSTITUTED *p*-PHENYLENEDIAMINES

Substituent	No Addn., 1/*t*	pH 11.0 *k*	*I.C.*	Na_2SO_3, pH 11.0 1/*t*	*k*	No Addn., 1/*t*	pH 12.7 *k*	*I.C.*
None	0.075	0.021	1.9	0.062	0.016	0.53	0.064	0.86
N-Methyl	.68	.066	0.5	.68	.066	2.?	.10	.1
N,N-Dimethyl	.28	.011	0	.42	.041	1.1	.085	.3
N,N'-Dimethyl	3.0	.12	0	3.0	.12	3.6	.12	0
N,N,N'-Trimethyl	0.60	.020	0	2.0	.086	3.3	.13	0
N,N,N',N'-Tetramethyl	.1	.0025	0	0.15	.0038	0.15	.004	0

Bibliography

(1) T. H. James, Photographic Science and Technique Vol. 16B, No. 4, Nov. 1950, p. 83.

(2) R. L. Bent, J. C. Dessloch, F. C. Duennebier, D. W. Fassett, D. B. Glass, T. H. James, D. B. Julian, W. R. Ruby, J. M. Snell, J. H. Sterner, J. R. Thirtle, P. W. Vittum, and A. Weissberger, "Chemical Constitution, Electrochemical, Photographic, and Allergenic Properties of *p*-Aminodialkylanilines," J. Am. Chem. Soc., to be published.

(3) T. H. James, J. Phys. Chem., Vol. 43, p. 701 (1939).

LETTERS TO THE EDITOR

Dear Sir:

I should like to call your attention to two errors appearing in the November, 1950 issue of Photographic Science and Technique:

1. Page 79 . . . . "doubling the light by the use of two units . . . . will only increase the guide number by approximately one-fourth". According to the formula for computing the guide number, it varies as the square root of the available light. Doubling the light would therefore increase the guide number by the factor $\sqrt{2}$, an increase of 40%, approximately.

2. Page 82. The first fraction in the computation of the ratio between exposure with "standin lamp" and flashlamp should be inverted to read:

$$\text{Ratio} = \frac{22^2}{5.6^2} \times \frac{1}{1/200} = \frac{484}{31.4} \times 200 = 3200.$$

HOLLIS N. TODD

Rochester, N. Y., 12 Dec. 1950
Rochester Institute of Technology